

THE *EUPITHECIA*
(LEPIDOPTERA, GEOMETRIDAE)
OF CHILE

FREDERICK H. RINDGE

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ABSTRACT

The present paper is the first attempt to describe all the *Eupithecia* of Chile, including the Juan Fernandez Islands. The few previously named species are redescribed in the same format as the new species, with descriptions and illustrations of the adults, male antennae, ventral plates, and male and female genitalia. Separate keys are provided for males and females; a number of the species are known only from one sex, so the keys are, of necessity, incomplete.

The *Eupithecia* of Chile are divided into two sections. The first has males with the tergite of the eighth segment fully sclerotized, and the sternite (or ventral plate) with each lateral piece separate; the second has the male tergite reduced to a slender median strip and the ventral plate has a wide anterior basal portion with two attached, posteriorly extending arms. Section 2 is subdivided into four groups, based primarily on the nature of the female genitalia. These structures of the species of Section 1 have each bursa copulatrix elongate and membranous, with at least the posterior half having parallel striations. In Section 2, the females of Group A have the round or elliptical bursa copulatrix entirely membranous; of Group B, similar to the preceding but with symmetrical ornamentation, either in the form of areas or strips of minute spines or setae, or in elongate spines sur-

rounding or partially encircling the areas of minute spines; of Group C, the bursa copulatrix has a sclerotized, usually longitudinally striate strip extending between the ductus bursae and the origin of the ductus seminalis; and, of Group D, the bursa is an elongate structure with numerous prominent stellate spines encircling the organ.

A total of 43 species are recognized in this paper. Of these, three are endemic to the Juan Fernandez Islands, while the remaining 39 are endemic to the mainland of Chile. Of the latter, the following 29 are described as new: *anticura*, *atacamaensis*, *ay-senae*, *cabrasae*, *caburgua*, *canchasae*, *correana*, *curacautinae*, *encoensis*, *grappleri*, *horismoides*, *juncalensis*, *malchoensis*, *mallecoensis*, *maule*, *nahuelbuta*, *nublae*, *osornoensis*, *petrohue*, *picada*, *pucatrihue*, *recintoensis*, *seatacama*, *taracapa*, *tenoensis*, *trancasae*, *transexpiata*, *valdivia*, *vallenarensis*, and *yelchoensis*.

The following new subjective synonyms are proposed: *Heteropithecia* Vojnits (1985), *Neopithecia* Vojnits (1985), and *Propithecia* Vojnits (1985) are placed under *Eupithecia* Curtis (1825); *akerbergi* Vojnits (1985) under *spurcata* Warren (1904); *praelongata* Warren (1900) and *davisi* Vojnits (1985) under *sibylla* Butler (1882); and *kristenseni* Vojnits (1985) under *rosalia* Butler (1882).

INTRODUCTION

This paper developed out of two of my long-term interests, the systematics of the Geometridae of Chile and of the genus *Eupithecia*. I have been working with the former for several decades in order to get the collection of the American Museum of Natural History organized so that attempts could be made to classify these moths (Rindge, 1961, 1971, 1973, 1975, 1983, 1986). Over the years I have been interested in the systematics of the North American *Eupithecia* (Rindge, 1952, 1956, 1963, 1985), and have dissected all these species available to me.

Eupithecia Curtis is a member of the Larentiinae. It is probably the largest genus in that subfamily, and it occurs throughout most of the world. These moths are usually difficult to identify, as they are small, most often various shades of gray or brown, and have similar obscure maculation; the pattern is sometimes partially or completely lost, as the wings tend to lose some of their scales when caught unless carefully handled. The genitalic organs

of both sexes, however, usually have good specific characters and therefore play an important part in the taxonomy of the genus. In the New World, south of the United States border, it is extremely difficult to make determinations due to an almost complete lack of modern work, including descriptions and illustrations of the genitalic organs. Between 1950 and 1984 there was but one paper (Fletcher, 1953) that described and illustrated these structures; this was for two species from Argentina. I am not aware of any earlier papers that were so illustrated. This entire fauna is in need of careful systematic work, not only to identify those species that have been described but to name the numerous ones that have yet to be made known.

Eleven species of *Eupithecia* were described from Chile between 1863 and 1904 by Walker (one), Butler (six), Mabille (one), Staudinger (one), and Warren (two); three additional ones were named by Prout in 1922 from the Juan Fernandez Islands, and these

adults were illustrated. Since none of the above authors either described or illustrated genitalia, and since their descriptions were brief and unsatisfactory, it has been impossible to safely name any member of this genus from Chile.

To fill this great void, both Dr. A. M. Vojnits, of the Hungarian Natural History Museum, and I began working on this problem at about the same time. Our original efforts were completely independent and, in fact, we were unaware of each other's project. In due course we exchanged correspondence on our mutual interests; due to a number of reasons we agreed that it would be best if we both continued independently, even though this would sometimes mean some duplication of effort and, perhaps, some inadvertent synonymies.

At the present time, 43 species are known from Chile; in addition, one species (*antartica* Staudinger) is unknown to me. Of these, three are endemic to the Juan Fernandez Islands, while the remaining 39 are endemic to the mainland. This high percentage of endemism does not surprise me. The Juan Fernandez Islands lie some 600 km west of Valparaiso, are entirely volcanic, and apparently have never been connected to the mainland. Masatierra is the largest island, and it is between 3.8 and 4.2 million years old; it is the type locality for three species of *Eupithecia*. The Juan Fernandez group is "remarkable for the high degree of endemism of the native flora"; there are 147 indigenous angiosperm species, of which 69 percent of them and 19 percent of the genera are endemic (Stuessy et al., 1984). Given the above facts, and excluding any recent introductions, it would be surprising if the three species of these moths that occur there were not endemics. My studies on other groups of geometrids from the mainland of Chile (Rindge, 1971, 1973, 1975, 1983, 1986) have indicated a large number of endemic species and genera. When additional collecting, both in Chile and in parts of adjacent Argentina, has taken place and this material carefully analyzed, it is possible

that some species will be found in common for these two countries, and this will reduce the percentage of endemism in Chile.

The present paper summarizes our knowledge of this difficult genus from Chile, with separate keys for the males and females (insofar as they are known). All species, including their genitalia, are described and illustrated, although several taxa are known only from one sex. Much collecting still needs to be done in Chile, not only to obtain adequate material, but to enable us to get a better idea on the distribution of the taxa that occur there.

Nothing is known about the early stages or food plants of the members of this genus in Chile.

ACKNOWLEDGMENTS AND ABBREVIATIONS

I acknowledge with thanks the cooperation and aid of the following colleagues who have permitted me to study types and specimens in their charge: Dr. M. J. Scoble for the Department of Entomology, British Museum (Natural History; BMNH), Dr. G. Bernardi for the Laboratoire d'Entomologie, Muséum National d'Histoire Naturelle, Paris, and Dr. D. C. Ferguson for the United States National Museum of Natural History, Smithsonian Institution (USNM). Nearly all the specimens illustrated are from the collection of the American Museum of Natural History (AMNH).

My thanks go to Mr. Louis Sorkin, of the Department of Entomology, for help with the Olympus BH2 photomicrographic system. I took all the photomicrographs with this, and used a Polaroid MP-3 camera for the moths themselves. The photographs of the former were processed by the museum's Photographic Studio, and all of them were mounted by the Department of Graphics.

I am also grateful to Drs. W. Clayton McGuffin, David A. Grimaldi, and Randall T. Schuh for reviewing the manuscript and offering their suggestions for its improvement.

MATERIALS AND METHODS

The results of this paper are based on the Chilean *Eupithecia* in the AMNH, numerous

specimens and types from the BMNH, and those moths not out on loan from the USNM.

As genitalic studies are usually necessary to make determinations in *Eupithecia*, these preparations have been done by the author; of the 308 AMNH specimens, 120 have been dissected. It should be noted that only two species are represented in series in that collection, *spurcata* by 92 specimens (60 males, 32 females) and *sibylla* by 77 (28 males, 49 females); these two taxa constitute slightly under 55 percent of the individuals in this collection for the 42 Chilean species in the genus.

Specimens and all the primary types from Chile, including the Juan Fernandez Islands, in the BMNH have been studied; these number 44 moths and 19 dissections. The holotype of *inexpiata* Walker is in poor condition, and so only its genitalia and abdomen have been studied. The BMNH collection contains 12 holotypes or lectotypes; of these; the genitalia of all have been studied except for *spurcata* (Warren) and *sibylla* Butler. Both these species are distinctive and so there is no question in my mind as to what they represent; *spurcata* was not dissected and *sibylla* is without an abdomen.

The one relevant type in the Muséum National d'Histoire Naturelle has been studied; it is *semilotaria* Mabilie.

The one unexamined type is *Eupithecia antarctica* Staudinger. Dr. H. J. Hannemann, of the Museum für Naturkunde der Humboldt-Universität zu Berlin, believes this type to be in that collection but he could not find it due to the uncurated condition of the Geometridae. In addition, the original description of this species has not been available to me, and so the name *antarctica* will have to be placed as an unrecognized species at this time.

In 1985, Vojnits described four species of *Eupithecia* as new; three are being placed in the synonymy in this paper as they match some of the types in the BMNH. I have not examined the Vojnits types but the descriptions and illustrations are adequate for me to determine the species.

Dr. Ferguson was able to find a few specimens in the USNM collection that were not out on loan; five of these have been dissected.

A summary of the material studied for this paper is that 360 specimens and 144 genitalic dissections have been examined. In addition,

slide mounts of the antennae of all available males, either separately on their own slide with the legs of the species, or else included in the genitalic slides, have been made.

No attempt was made to inflate the vesicas when doing the dissections of the male genitalia; this is a very delicate procedure on moths as small as these. (For a description of this technique, see Blanchard and Knudson, 1985.) At some future time this will have to be done so that the vesica can be described and illustrated properly; in most species this structure is very difficult to study when it is in place within the aedeagus.

The configuration of the eighth abdominal segment of the males is of great importance in classifying these moths. Both the tergite and sternite are of value; they can be studied after the abdomen has been cleared and mounted on a slide, together with the genitalia. It has been found most useful to split the membranous area on one side of the eighth segment while making the dissection; this will allow the tergite and sternite (also known as the ventral plate) to lie flat, side by side, so that both can be studied. McDunnough (1949: 544) suggested removing a few scales from the ventral tip of the abdomen in order to observe the ventral plate. While this often works with the North American species and their relatively heavily sclerotized sternite, it is not a useful procedure for the majority of the Chilean species, due to the slight amount of sclerotization of the structure.

When I started this project I continued my usual practice of clearing and mounting one antenna and a set of three legs from each specimen whenever possible. A study of the Canadian balsam mounts showed that by far the best characters were to be found in the male antennae, but that the female antennae and the legs of both sexes were not that helpful. In later preparations I cleared and placed one male antenna taken from the same specimen on the same slide with the abdomen and genitalia. I have found it necessary to make slide mounts of the antennae so that the finer structures can be studied; when dry and on the specimen the ultrastructures usually cannot be successfully examined, not only from the point of magnification but by the obstruction caused by the often long and numerous setae that are present.

Whenever possible I have designated males as the holotypes of my new species. This often meant using specimens with worn or almost scaleless upper surfaces of the wings, even when females in better condition were available to me. My reason is that the males have more characters that can be used for determining the species, as the antennae and ventral plates have good specific characters which are not present in the females. In addition, the male genitalia are more complex than are the corresponding female structures, and thus usually offer more characters.

The locality information for the type series of the numerous new species is as given on the specimen labels; all of these refer to the old provinces rather than to the present-day regions, areas, and their (sometimes renamed or redrawn) provinces. It is my feeling that the above data are not only better known to non-Chileans but are much more liable to be found on most maps and atlases and therefore should be relatively easy to locate. The distributional data for each species, insofar as known, are summarized in a summary paragraph on Distribution. In these sections, the new regions have been utilized, with the revised provinces given in parentheses; they are listed from north to south for each species. A source for the new political terminology

can be found in Davis (1986: map 1). This author also gives and defines the major biotic provinces for Chile (op. cit., map 2: 4–15). I have listed these faunal areas in the information given in my Distribution paragraph, using Davis as the source.

I have made no attempt to place various characters as being plesiomorphic or apomorphic. I am reasonably familiar with the majority of the 160 species of *Eupithecia* that are found in North America, north of Mexico, but this number is but a fraction of the number of species that occur worldwide. Approximately 40 years ago over 800 species were recognized; since then, many more have been described from various parts of the globe. Very few of these were from the New World, south of the United States; this area is practically unstudied and has a very large number of species, the majority undescribed. In Chile alone there are 43 species described in this paper; prior to 1985 about one-fourth of them had been named, and none had been adequately described, with the genitalia, terminal segment of the abdomen, and antennae being depicted in words or figures. Lacking knowledge of the extent of the genus as a whole, and of the various characters that will be found in the undescribed species, it would be premature to designate character states.

CHARACTERS

McDunnough (1949: 540–545) presented a very thorough and informative section entitled “Structural Details of *Eupithecia*,” with palpi, male (and female) antennae, front, thorax, abdomen, wing venation, hind tibial spurs, male genitalia (including the ventral plate), and female genitalia being treated in considerable detail. Because of this there is no need for me to repeat all this information; instead, I will briefly discuss those characters that have been found useful in the present study.

The palpi vary in length from species to species, from being shorter than the eyes to much longer. They also may differ within a given species, as some have the palpi of about the same length in both sexes; in others the females often have somewhat longer struc-

tures than do their corresponding males. The length is expressed as the distance the palpi project beyond the front margin of the eyes; it is given as both a percentage of the length of the eye, and as a measurement expressed in millimeters. In some cases the percentage figure may be larger for the females than the males. When an actual measurement is given it may be found that the palpi of both sexes are more equal in size than it would appear at first glance. Considerable care must be taken, as this structure, especially in those species with an elongate pair, may have been bent or pushed to one side; in such cases, misleading data can be obtained.

The eyes, based on their horizontal length, may be the same size in both sexes of the same species, or they may be smaller in fe-

males than in males. This variability may cause an apparent difference in the length of the palpi (see preceding paragraph).

The male antennae are extremely useful in helping to make determinations, as they show great variability in structure (see figs. 49–74). They vary from being ciliate, with very little development on the ventral surface, to laterally flattened with the anterior portion concave (when viewed laterally), to having variably developed pairs of lobes ventrally, with the posterior always being larger. The extreme form of the last variation is when the lobes are so long and slender that the antennae are bipectinate. These forms are but steps in a transformation series in the antennal structures. It is usually difficult to make out the fine details of the male antennae in dry specimens; for this reason it is strongly suggested that at least one antenna be cleared and slide mounted so that it can be studied with the aid of a microscope, often necessitating the use of relatively high power.

The female antennae appear to be rather similar from species to species, and hence have been found to be of relatively little use taxonomically.

The eighth abdominal segment of the males has very useful characters. The tergite can be either fully sclerotized or have the sclerotization reduced to a slender, digitate process; this is the primary character that I use to divide the Chilean species into two sections. The sternite, or ventral plate, has characters of specific value; it varies in shape from two separate, lateral areas to a single slender projection, variably bifurcate at the apex (see figs. 75–106).

The uncus is either long and slender, terminating in a single point, or has the apex laterally flattened, with two distinct, widely separated points.

The valves either have their outer margin curved and unsclerotized, or the sacculus is variably sclerotized and projects as either a slender, sharply pointed structure or as a broader, digitate process (see figs. 107–140).

The aedeagus appears to have few diag-

nostic characters, although it varies from being narrow anteriorly to being of more or less equal width throughout.

The vesica has good specific characters which, unfortunately, are difficult to discern when the structure is enclosed within the aedeagus. As has been pointed out above, each vesica should be exerted in order to describe the characters fully. The majority of species appear to have all or most of the aedeagus filled with a vesica containing one or more sclerotized pieces plus a spinulate membrane; another type has what appear to be separate anterior and posterior pieces. Another variable feature is the presence or absence of a small, variably shaped, sclerotized basal piece.

The bursa copulatrix is relatively variable, but the shape and ornamentation can be broken down into a relatively few basic categories. These are: (a) elongate, membranous, with at least the posterior half having parallel striations, the latter with or without inwardly pointing teeth (figs. 141–144); (b) rounded or elliptical, entirely membranous, although the surface may be evenly and minutely dentate or spinulate (figs. 145–152); (c) similar to the preceding, but with symmetrical ornamentation, the latter either in the form of areas or strips of minute spines or setae, or in elongate spines surrounding or partially encircling the areas of minute spines (figs. 153–172); (d) a more or less ovoid membranous structure having a sclerotized, usually longitudinally striate, strip extending between the ductus bursae and the origin of the ductus seminalis (figs. 173–192); (e) an elongate structure with numerous, encircling, prominent spines (figs. 193–199). These five types form the basis of grouping the species of the genus into as many assemblages.

The origin of the ductus seminalis is rather limited in its range of placement. Using the above five categories for the bursa copulatrix, the points of origin are as follows: (a) laterally on the right side; (b) laterally on the right side or ventrally; (c) ventrally, rarely on the right; (d) ventrally; (e) off-center ventrally to the right side.

SYSTEMATIC DESCRIPTIONS

Genus *Eupithecia* Curtis

Eupithecia Curtis, 1825: 24. (No attempt is made to give a complete bibliography for this genus

and of its previously designated synonyms; see McDunnough, 1949: 539; Fletcher, 1979: 83; and Ferguson, 1983: 105 for this information.)

Type species: [*Phalaena*] *absinthiata* Clerck, 1759.

Propithecina Vojnits, 1985: 407; type species, *P. kristenseni* Vojnits, 1985. NEW SYNONYMY.

Heteropithecina Vojnits, 1985: 412; type species, *H. atacama* Vojnits, 1985. NEW SYNONYMY.

Neopithecina Vojnits, 1985: 415; type species, *N. akerbergi* Vojnits, 1985. NEW SYNONYMY.

In recent years, workers have begun to recognize that the antennae, especially those of the males, may have good specific characters, and can frequently be used to distinguish species that have similar facies. McDunnough (1949) was among the first to call attention to this on a continent-wide basis in his revision of the North American *Eupithecia*; he defined three rather broad types of male antennae, plus the very distinctive antennae of the common and widespread *miserulata* Grote. This species has two pairs of slender basal tubercles and one, slightly shorter, distal pair, plus their associated elongate setae. Although this highly developed type of antennae is very different from those of all the other known North American species, no one has ever placed *miserulata* in another genus, as it is realized that the modified antennae are but a specific character of that species.

As noted by Inoue (1979) in the introduction of his paper on the *Eupithecia* of Japan, several workers have attempted to subdivide this huge genus into several subgenera or species groups; in his opinion none has succeeded, and I agree with him. Another attempt was made along these lines for the Chilean fauna. Vojnits (1985) proposed three new monotypic genera; they were *Propithecina* (type species: *P. kristenseni*, new species; I place the latter as a synonym of *E. rosalia* Butler), *Heteropithecina* (type species: *H. atacama*, new species), and *Neopithecina* (type species: *N. akerbergi*, new species; I place the latter as a synonym of *E. spurcata* Warren). The above generic-group names were differentiated from *Eupithecia* "... principally and essentially by the antennal structure ...," and because "... the genitalia are different." These statements are repeated, with slight variations, for all three genera by Vojnits and are the only distinguishing characters given by him for his three genera.

In the Chilean fauna there is a broad spec-

trum of types of male antennae in *Eupithecia*, as outlined above under Characters, and illustrated in figures 49–74. When all the species known to me were studied it became apparent that a transformation series existed between the extreme types, and hence this one structure cannot be used as the criterion upon which to erect valid genera. In no place does Vojnits specify or define what genitalic characters he considered to be of generic value; he gives the specific descriptions of each type species but you are left on your own to try to distinguish between generic and specific characters. Once again, as with the antennae, there is a considerable range of genitalic characters in both sexes within the genus, but nothing that I would consider to be of generic value. Therefore, as neither the antennal nor genitalic characters, or both taken together, define natural groups at the generic level, I am synonymizing the three generic names proposed by Vojnits.

The approach that I have taken in the present paper to subdivide the *Eupithecia* of Chile does not involve either generic- or species-group names. My basic subdivision of *Eupithecia* into two sections is based on the nature of the sclerotization of segment VIII of the male abdomen. Section 1 is a small group of species with similar characters that I consider to be monophyletic. Section 2 is a large group of species that have more diverse characters overall, but similar abdominal characteristics. The latter section is subdivided into four groups, based primarily on the nature of the female genitalia. Within each of these groups there may be a variety of male antennal types and male genitalia. Several species are known only from one sex; the most extreme example is the four species placed in Group D, which are known from the female only. As a result of this, it may turn out that some of the present groups are polyphyletic, and will need to be revised when additional materials come to hand.

KEY TO SPECIES

*Males*¹

1. Uncus with apex laterally flattened, sclerotized, terminating in two well-defined,

¹ The males of *antarctica*, *anticura*, *aysenae*, *cabrasae*, *caburgua*, *encoensis*, *grappleri*, *halosydne*, *inexpiata*,

- widely separated points 10
 Uncus with apex not as above 2
- 2(1). Ventral plate with wide anterior portion (figs. 79–106); segment VIII with slender median sclerotized strip dorsally 6
 Ventral plate with each lateral piece separate, not united anteriorly (figs. 75–78); segment VIII fully sclerotized on dorsal surface 3
- 3(2). Vesica with anterior sclerotized piece having pointed posterior end 4
 Vesica with anterior sclerotized piece having rounded end or connected to posterior piece 5
- 4(3). Vesica with posterior sclerotized piece widest posteriorly, posterior end with small swellings, piece constricted and weakly angled medially (fig. 110)
 *seatacama*
 Vesica with posterior sclerotized piece not widened posteriorly, of equal width for entire length except for small median constriction, straight (fig. 109)
 *atacamaensis*
- 5(3). Palpi extending 0.90 mm beyond front margin of eyes *atacama*
 Palpi extending 0.75 mm beyond front margin of eyes *osornoensis*
- 6(2). Sacculus with outer margin rounded .. 7
 Sacculus with prominent projection on outer margin (fig. 136) *maule*
- 7(6). Ventral plate broadly and evenly triangular, without definite widened base (fig. 84) *spurcata*
 Ventral plate elongate, slender, with definite widened base 8
- 8(7). Sacculus with outer margin rounded .. 9
 Sacculus with outer margin angled, with sclerotized edge extending from base to angle (fig. 113) *trancasae*
- 9(8). Ventral plate with parallel sides until reaching base; vesica with small, broad, C-shaped sclerotized piece anteriorly (fig. 82) *correana*
 Ventral plate with sides tapering to base; vesica with small, broad, weakly angled sclerotized piece anteriorly (fig. 86) ..
 *canchasae*
- 10(1). Sacculus with outer margin rounded or angled 11
 Sacculus with prominent projection on outer margin 20
- 11(10). Antennae shortly ciliate, under surface of segments either with or without minute posterior and anterior lobes 12
 Antennae pectinate, with posterior pair of lobes about as long as their antennal segments 14
- 12(11). Ventral plate with prominent sclerotized posterior points (fig. 85); sacculus with outer margin angled (fig. 117)
 *curacautinae*
 Ventral plate membranous, posterior points not sclerotized; sacculus with outer margin rounded 13
- 13(12). Ventral plate very slender, sides parallel, arms short, 20% length of plate (fig. 95); palpi with length equal to length of eyes *taracapa*
 Ventral plate broad, tapering, arms 40% length of plate (fig. 83); palpi extending beyond front of eyes a distance shorter than length of eyes *malchoensis*
- 14(11). Ventral plate with posterior points sclerotized for less than 50% length of plate 16
 Ventral plate with posterior points sclerotized for at least 80% length of plate 15
- 15(14). Longest antennal segments about 60% length of their basal segments (fig. 62); palpi extending beyond front of eyes 0.8 mm, and dark grayish black in color ...
 *petrohue*
 Longest antennal segments about 125% length of their basal segments (fig. 56); palpi extending beyond front of eyes 0.6 mm, and pale grayish brown in color *nahuelbuta*
- 16(14). Length of forewings 8.0 to 9.0 mm ... 17
 Length of forewings 14.0 to 15.5 mm
 *horismoides*
- 17(16). Palpi buff to brown, and extending 0.8 mm beyond front of eyes 18
 Palpi brown, blackish basally, and extending 0.6 mm beyond front of eyes *oenone*
- 18(17). Upper surface of wings white, covered with pale brown scales; costal margin of forewings with large dark brown triangular mark extending to include discal spot 19
 Upper surface of wings dark brown; costal margin of forewings with rectangular orange-buff spot marking origin of t. p. line, and with white dots forming s. t. line *corralensis*
- 19(18). Ventral plate with tips of arms completely sclerotized (fig. 90); antennae with longest pectinations as long as their basal segments (fig. 63) *yelchoensis*
 Ventral plate with outer margins of arms

nublae, *physocleora*, *recintoensis*, *semilotaria*, *usta*, *valdivia*, and *vallenarensis* are either unknown or the specimens available to me do not have the necessary characters present to enter them into the key.

- sclerotized (fig. 88); antennae with longest pectinations 80% as long as their basal segments (fig. 65) .. *transexpiata*
- 20(10). Sacculus with outer margin having slender, sharply pointed projection (fig. 128) *sibylla*
Sacculus with outer margin having wide, apically rounded projection 21
- 21(20). Vesica with broad sclerotized piece in basal half of aedeagus, and without additional ornamentation; sacculus with projection 50% width of valve (fig. 132) *tenoensis*
Vesica with sclerotized piece and ornamentation occupying about entire length of aedeagus; sacculus with projections less than 33% width of valve 22
- 22(21). Ventral plate with anterior margin having central half sharply recessed into its base, with recessed portion almost flat, and with posterior end of plate broad, the lateral lobes extending half the length of plate (fig. 96) *juncalensis*
Ventral plate with anterior margin having median indentation, and with posterior end narrower and with lateral lobes wider and shorter 23
- 23(22). Palpi extending 1.1 mm beyond front margin of eyes *picada*
Palpi extending 0.6 to 0.9 mm beyond eyes 24
- 24(23). Ventral plate with apical region slightly wider than median area, and with arms not exceeding 25% length of plate .. 25
Ventral plate with apical region not swollen, and with slender arms extending about 33% length of plate (figs. 101–104) *rosalia*
- 25(24). Ventral plate with width of base 0.4 mm 26
Ventral plate with width of base 0.6 mm (fig. 99) *mallecoensis*
- 26(25). Antennae with lamellate projections (fig. 70) *pucatrihue*
Antennae with slender, rodlike projections (fig. 73) *frequens*
- Bursa copulatrix variously striated or ornamented 6
- 2(1). Palpi extending 1.1 to 1.6 mm beyond front of eyes 3
Palpi extending 0.6 to 0.8 mm beyond front of eyes 4
- 3(2). Length of forewings 8.0 to 9.0 mm
..... *halosydne*
Length of forewings 1.4 to 1.6 mm
..... *horismoides*
- 4(2). Forewings mostly white, with dark anterior median area and outer edge of wings, and with broad, white, t. p. line *oenone*
Forewings primarily pale brown, gray and dark grayish black, without very prominent t. p. line as above 5
- 5(4). Palpi 0.6 mm long, dark grayish brown with white scaling ventrally, being concolorous with front *valdivia*
Palpi 0.8 to 0.9 mm long, second segment pale brown to grayish brown with white scaling ventrally, third segment narrowly white basally, then brown, the palpi (except for white scales) darker than front *physocleora*
- 6(1). Bursa copulatrix with longitudinal striations (figs. 141–144) 7
Bursa copulatrix spinose, with symmetrical ornamentation, or with sclerotized strip between ductus bursae and ductus seminalis 9
- 7(6). Longitudinal striations on posterior portion of bursa copulatrix, no inwardly pointed spines from striations (fig. 141) *osornoensis*
Longitudinal striations extending for most of length of bursa copulatrix, and having variable number of prominent, inwardly pointing spines on striations 8
- 8(7). Bursa copulatrix with left side swollen, and anterior end with small corneous area (figs. 143, 144); palpi extending 0.9 mm beyond front margin of eyes
..... *atacamaensis*
Bursa copulatrix slightly wedge-shaped, the lateral margins straight or weakly convex (fig. 142); palpi extending 1.0 to 1.1 mm beyond eyes *atacama*
- 9(6). Bursa copulatrix with spines encircling bursa (figs. 193–199) 10
Bursa copulatrix not as above 13
- 10(9). Forewings with upper surface reddish brown, with broad t. a. band and posterior portion of median area pale grayish white *usta*
Forewings not as above 11

Females²

1. Bursa copulatrix entirely membranous, without striations or ornamentation (figs. 145–152) 2

² The females of *antarctica*, *atacama*, *canchasae*, *coralensis*, *grappleri*, *inexpiata*, *nahuelbuta*, *nublai*, *petrohue*, *recintoensis*, *rosalia*, *seatacama*, *semilotaria*, *tara-capu*, *tenoensis*, and *transexpiata* are either unknown or the specimens available to me do not have the necessary characters present to enter them into the key.

- 11(10). Palpi extending 1.3 mm beyond front margin of eyes *inepta*
Palpi extending 0.5 to 0.6 mm beyond eyes 12
- 12(11). Bursa copulatrix slender, with parallel sides (figs. 195, 196); palpi extending 0.5 mm beyond front margin of eyes *recintoensis*
Bursa copulatrix widest anteriorly (figs. 193, 194); palpi extending 0.6 mm beyond eyes *nublæ*
- 13(9). Bursa copulatrix with symmetrical ornamentation, having one such area on each side of bursa (figs. 153–172) 14
Bursa copulatrix with sclerotized strip extending between ductus bursae and ductus seminalis (figs. 173–192) .. 22
- 14(13). Bursa copulatrix with ornamentation consisting of large, more or less circular, finely spinose areas, these with or without a variable number of larger spines 18
Bursa copulatrix with ornamentation consisting of elongate, slender areas of thickly set, short spines 15
- 15(14). Ductus seminalis near ductus bursae, in posterior portion of bursa copulatrix; palpi extending 0.75 to 0.90 mm beyond front margin of eyes 16
Ductus seminalis in anterior portion of bursa copulatrix (fig. 153); palpi extending 0.60 mm beyond front of eyes *trancasæ*
- 16(15). Bursa copulatrix with ornamentation on ventral and dorsal surfaces, being connected by area of minute swollen mounds or with surface weakly serrate 17
Bursa copulatrix with ornamentation on ventral and left (lateral) surfaces, with intervening surface smooth (fig. 169) *anticura*
- 17(16). Palpi extending 0.9 mm beyond eyes; length of forewings 8.5 to 9.0 mm *yelchoensis*
Palpi extending 0.8 mm beyond eyes; length of forewings 9.5 mm .. *aysenæ*
- 18(14). Symmetrical ornamentation of bursa copulatrix without large spines ... 19
Symmetrical ornamentation of bursa copulatrix with variable number of long spines 20
- 19(18). Bursa copulatrix with scattered spines on dorsal surface (fig. 156); palpi extending 0.75 mm beyond front of eyes *cabrasæ*
Bursa copulatrix without dorsal spining (fig. 164); palpi extending 0.60 mm beyond front of eyes *curacautinae*
- 20(18). Symmetrical ornamentation of bursa copulatrix with outer row of short, slender spines (figs. 161, 162); palpi extending 0.6 mm beyond front of eyes *malchoensis*
Symmetrical ornamentation of bursa with outer row of long spines; palpi extending 0.7 to 0.8 mm beyond front of eyes 21
- 21(20). Symmetrical ornamentation of bursa copulatrix with numerous long slender spines; ductus seminalis arising posteriorly on right side (figs. 159, 160) ... *spurcata*
Symmetrical ornamentation of bursa copulatrix with from six to nine thick spines on each side; ductus seminalis arising ventromedially (figs. 157, 158) *correana*
- 22(13). Sclerotized strip of bursa copulatrix narrow, 0.10 to 0.15 mm wide, raised, sharply defined, without longitudinal striations (fig. 173) *sibylla*
Sclerotized strip wider, weakly defined, with longitudinal striations 23
- 23(22). Palpi extending 1.35 mm beyond front margin of eyes *picada*
Palpi extending 0.65 to 0.90 mm beyond eyes 24
- 24(23). Ductus seminalis angled either to right side or posteriorly 25
Ductus seminalis extending posteriorly .. 28
- 25(24). Ductus seminalis directed to right side, angled posteriorly; bursa copulatrix with dorsal surface having rounded groups of small spines (figs. 175, 176) *juncalensis*
Ductus seminalis directed posteriorly, then angled to right side; bursa copulatrix without dorsal spines 26
- 26(25). Diameter of eye (viewed from side) 0.66 to 0.75 mm long *encoensis*
Diameter of eye 0.50 to 0.60 mm long 27
- 27(26). Sclerotized strip of bursa copulatrix about 0.2 mm wide, posterior end bluntly pointed or with small median lobe, and entire surface with very many longitudinal striations (fig. 179) *pucatrihue*
Sclerotized strip of bursa copulatrix about 0.3 to 0.4 mm wide, posterior end rounded, and entire surface sparsely striate (fig. 181) *mallecoensis*
- 28(24). Bursa copulatrix slender, with maximum width 0.66 to 0.70 mm (figs. 187, 188) *caburgua*
Bursa copulatrix wider, with widths of 0.90 to 1.30 mm 29

- 29(28). Ductus seminalis with posterior half abruptly swollen to almost twice diameter of basal portion (fig. 183)
 *maule*
 Ductus seminalis of even width or slightly tapering posteriorly 30
 30(29). Ductus seminalis smooth, with or without a very few longitudinal striations, and with few or no striations on bursa copulatrix anterior of origin of ductus seminalis (fig. 185) *frequens*
 Ductus seminalis with longitudinal striations, and bursa copulatrix variably striate anterior of origin of ductus seminalis (fig. 189) *vallenarensis*

SECTION I

The males are characterized by having the tergite of abdominal segment VIII fully sclerotized; by the ventral plate of the same segment having each lateral piece separate, not united anteriorly; by the vesica having two separate (anterior and posterior) sclerotized pieces; by the valves being simple, elongate, and narrow; and by the uncus terminating in an elongate single point. The females have each bursa copulatrix with longitudinal striations for part or most of its length and the striations are with or without some inwardly pointed teeth; the ostium bursae is membranous and funnel shaped, and there is no separate ductus bursae.

The male antennae are either ciliate or setose; the segments (when viewed laterally) vary from having the ventral margin more or less flat to having the posterior 67 percent broadly enlarged, with or without minute ventral setal-bearing lobes. All species have a small, rounded area laterally on each side of the segments; this structure is clearly defined and has an irregular surface. The eyes of the females are smaller than those of the males. The palpi project beyond the front margin of the eyes from 1.0 to 1.3 times the diameter of the eyes (males) to 1.5 to 2.0 times (females).

Eupithecia osornoensis, new species

Figures 1, 49, 75, 107, 141

DIAGNOSIS: This species has pointed forewings, with a prominent, divided, pale gray t. p. line. The male antennal segments are of almost equal height (when viewed laterally). The palpi extend beyond the front of the eyes

by a distance equal to the diameter of the eyes (males) or nearly 1.5 times the diameter (females). The ventral plate has each lateral piece broadly and evenly enlarged. The male genitalia have the vesica with the anterior sclerotized piece narrowly connected to the posterior and basal pieces. The female genitalia have nonspined longitudinal striations on the posterior portion of the bursa copulatrix.

ADULTS: Palpi very pale grayish brown, many scales with darker brown apices; palpi extending beyond front of eyes a distance from equal to diameter of eyes or 0.70 mm (males), to less than 1.5 times or 0.75 mm (females). Eyes of females smaller than those of males. Antennae of males (fig. 49) appearing setose, with segments of almost equal height (viewed laterally), with each segment having four minute swellings bearing short setae, of females minutely ciliate.

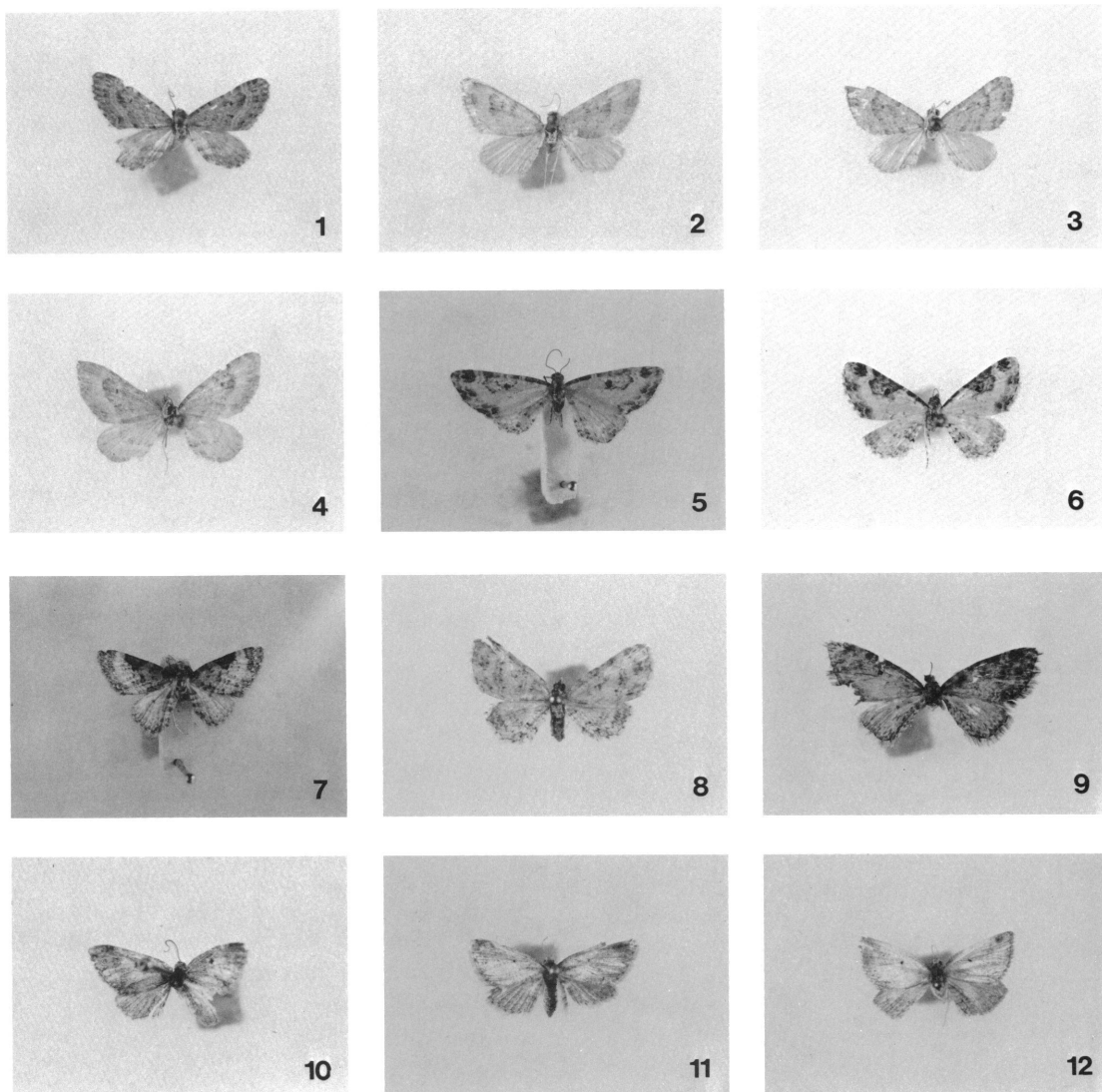
Upper Surface of Wings (fig. 1): Forewings elongate, with attenuate apex; pale gray with medium and dark brown scaling; costa with dark brown strips at origins of cross lines; latter indistinct except for broad, prominent, divided, pale gray t. p. line, and for slender, irregular s. t. line; discal dot elongate, slender, blackish brown; fringe white, broadly dark brown opposite veins. Hind wings paler than forewings, becoming darker distally; with broad, prominent, divided, pale extradiscal line; fringe similar to that of forewing.

Under Surface of Wings: Forewings evenly grayish brown, with discal dot and faint representation of broad t. p. line; fringe similar to that of upper surface. Hind wings pale gray with numerous brown scales; trace of small discal dot and of broad extradiscal line present in male, both absent in (worn) female; fringe similar to that of upper surface.

Length of Forewings: Holotype, male, 9.0 mm; paratype, female, 8.0 mm.

Segment VIII (fig. 75): Ventral plate with each lateral piece enlarged and rounded anteriorly, lightly sclerotized, narrowing posteriorly to median, sclerotized rod, inner margins of anterior portion shorter than outer, each rod curved inwardly in posterior portion, apex pointed.

Male Genitalia (fig. 107): Uncus with long, tapering, curved point; anellus broad, narrow, with prominent, curved posterior arms;

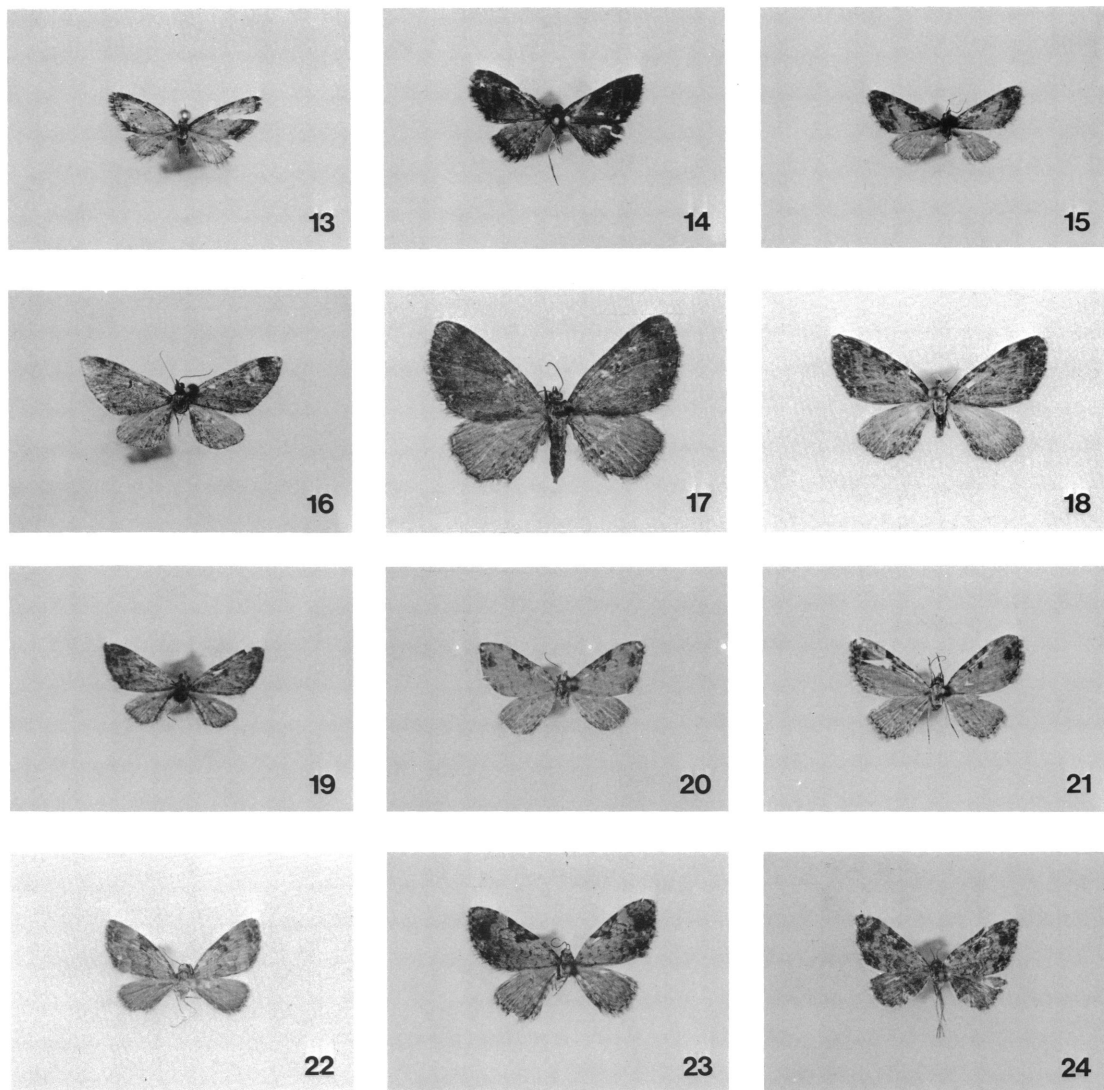


Figs. 1–12. Adults of *Eupithecia*. 1. *E. osornoensis*, new species, holotype male. 2. *E. atacama* (Vojnits), female. 3. *E. atacamaensis*, new species, holotype male. 4. *E. seatacama*, new species, holotype male. 5, 6. *E. oenone* Butler. 5. Holotype female (BMNH). 6. Female. 7. *E. grappleri*, new species, holotype male (BMNH). 8. *E. physocleora* Prout, lectotype female (BMNH). 9. *E. valdivia*, new species, holotype female. 10. *E. nahuelbuta*, new species, holotype male. 11, 12. *E. halosydne* Prout. 11. Lectotype female (BMNH). 12. Lectoparatype female (BMNH). All specimens in AMNH unless otherwise specified. $\times 1.35$.

valves broad basally, tapering to rounded apex; aedeagus with posterior 60 percent relatively wide, anterior 40 percent tapering to rounded point; vesica apparently with two anterior sclerotized pieces, a shorter one on left and ventrally, swollen and rounded, extending anteriorly as slender sclerotized rod,

with longer piece on right and dorsally, having much longer extension than previous piece, and with swollen posterior piece having convoluted margin on right side posteriorly, and slender, curved extension from left side extending anteriorly.

Female Genitalia (fig. 141): Bursa copu-

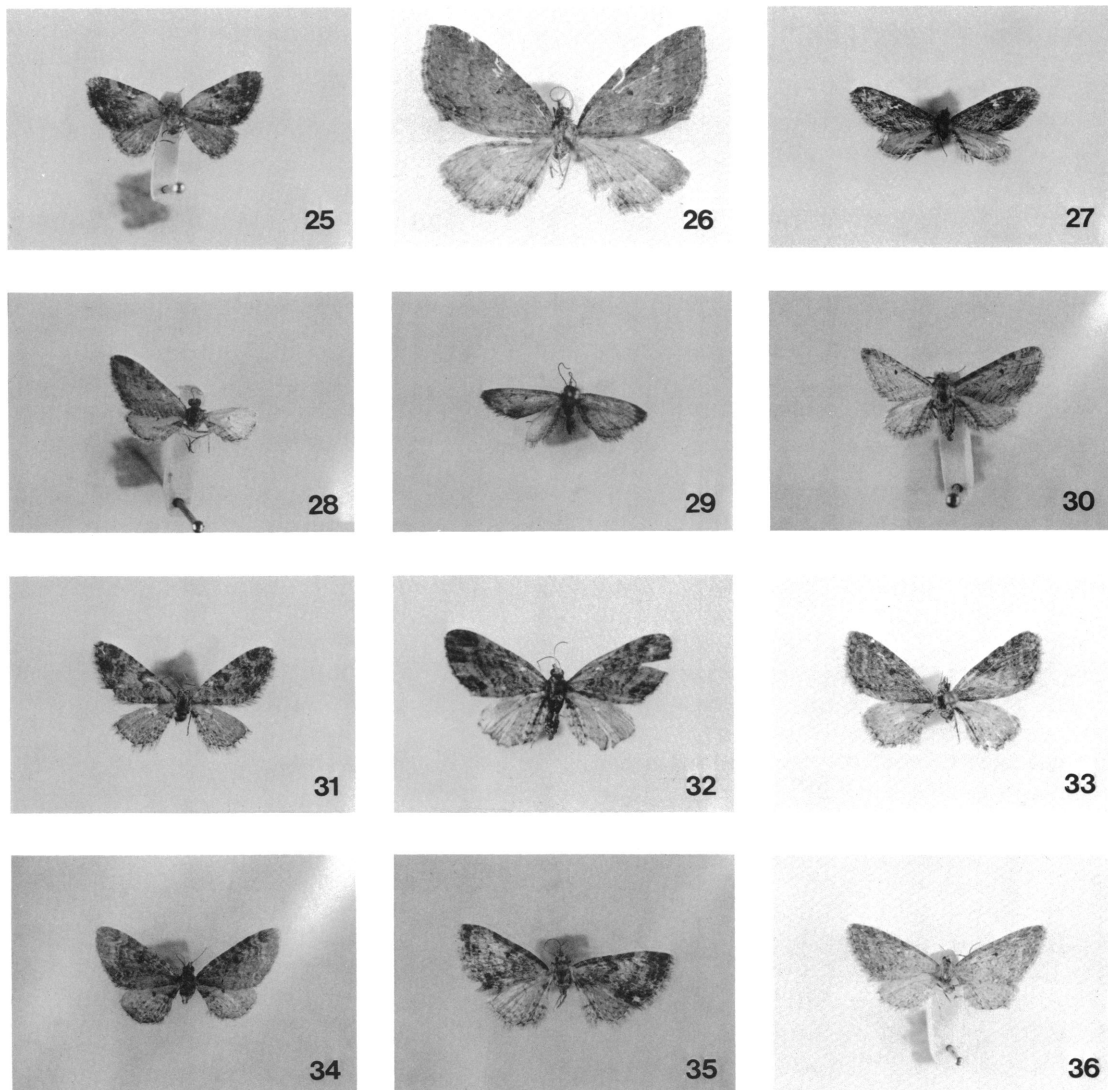


Figs. 13–24. Adults of *Eupithecia*. 13. *E. trancasae*, new species, paratype female. 14. *E. cabrasae*, new species, holotype female. 15. *E. correana*, new species, paratype female. 16. *E. malchoensis*, new species, paratype female. 17, 18. *E. spurcata* (Warren). 17. Lectotype female (BMNH). 18. Male, Chiloé Island. 19. *E. curacautinae*, new species, holotype male. 20. *E. transexpiata*, new species, holotype male. 21. *E. yelchoensis*, new species, paratype female. 22. *E. petrohue*, new species, holotype male (USNM). 23. *E. aysenae*, new species, holotype female. 24. *E. anticura*, new species, holotype female. All specimens in AMNH unless otherwise specified. $\times 1.4$.

latrix elongate, gradually increasing in width anteriorly, with anterior end broadly rounded, posterior half with slender longitudinal striations, ventral surface slightly more sclerotized than dorsal, striations without inwardly pointing teeth; ductus seminalis arising on right side posteriorly, directed posteriorly.

TYPES: Holotype, male, and paratype, female, Pucatrihue, coast of Osorno Province, Chile, February 1–10, 1967 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,443, and of the paratype on FHR 19,560.

Both type specimens have been deposited in the AMNH.



Figs. 25–36. Adults of *Eupithecia*. 25. *E. corralensis* (Butler), holotype male (BMNH). 26. *E. horismoides*, new species, holotype male. 27. *E. taracapa*, new species, holotype male. 28–30. *E. sibylla* Butler. 28. Holotype male (BMNH). 29. Holotype female of *E. praelongata* Warren (BMNH). 30. Female (BMNH). 31. *E. juncalensis*, new species, paratype female. 32. *E. picada*, new species, paratype female. 33. *E. pucatrihue* new species, paratype female. 34. *E. mallecoensis*, new species, paratype female (BMNH). 35. *E. mallecoensis* (?), Panguipulli, female (BMNH). 36. *E. rosalia* Butler, holotype female (BMNH). All specimens in AMNH unless otherwise specified. $\times 1.45$.

DISTRIBUTION: The Region of Los Lagos (coastal Osorno Province). This is in the Valdivian Forest Biotic Province.

TIME OF FLIGHT: February.

REMARKS: Two specimens (one male, one female), with the genitalia of each, have been examined.

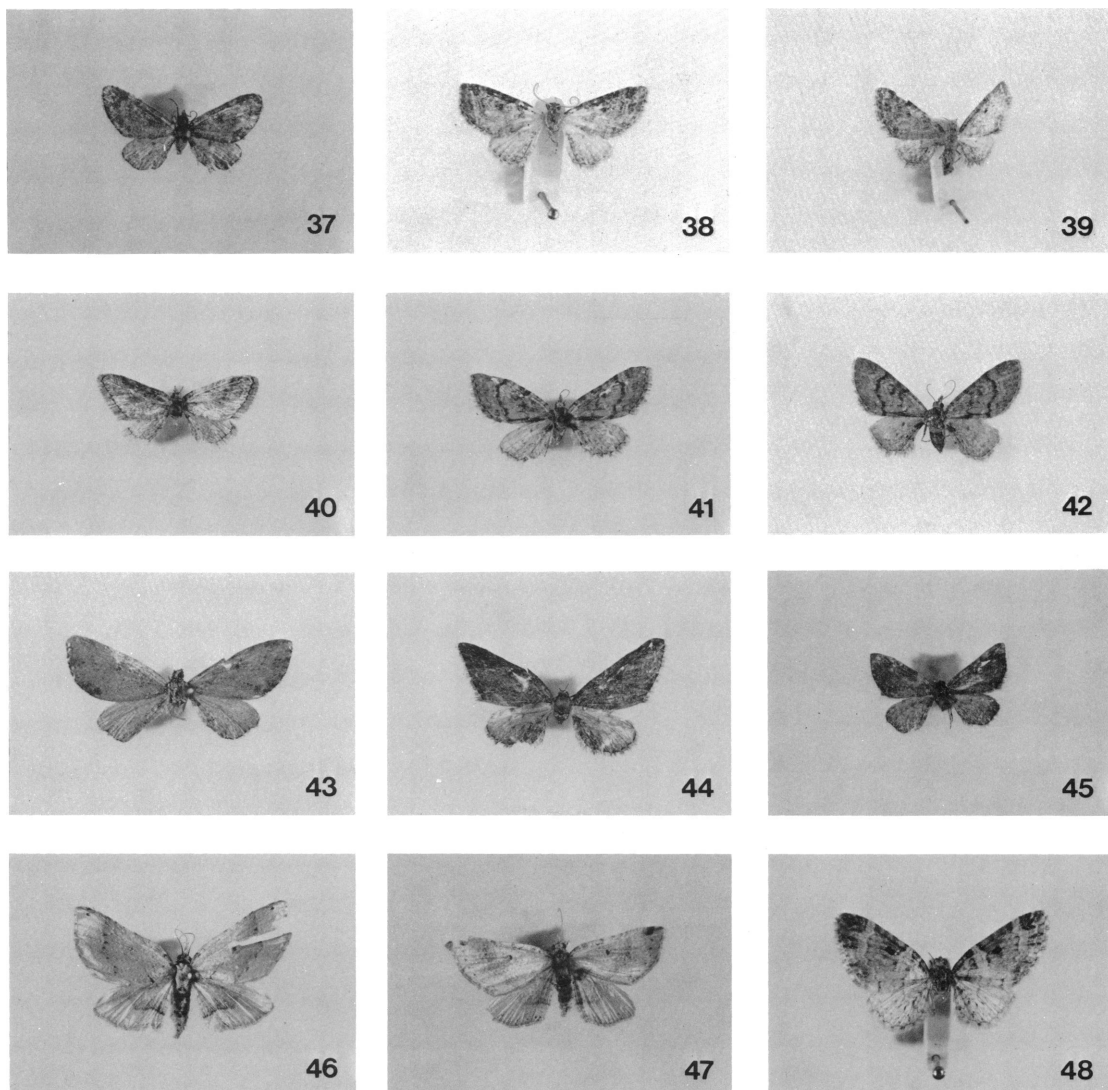
ETYMOLOGY: The specific name is an adjective derived from the type locality.

Eupithecia atacama (Vojnits),
new combination

Figures 2, 50, 76, 108, 142

Heteropithecia atacama Vojnits, 1985: 412, figs. 7–9, 15, 18, 21, pl. 2, figs. 1, 2.

DIAGNOSIS: This species has rather broad forewings with pointed apex, a broad, prominent whitish gray t. p. line with an irregularly



Figs. 37–48. Adults of *Eupithecia*. 37. *E. maule*, new species, paratype female. 38, 39. *E. frequens* Butler. 38. Lectotype male (BMNH). 39. Lectoparatype female (BMNH). 40. *E. caburgua*, new species, holotype female. 41, 42. *E. vallenarensis*, new species. 41. Holotype female. 42. Paratype female (BMNH). 43. *E. encoensis*, new species, holotype female. 44. *E. nublae*, new species, holotype female. 45. *E. recintoensis*, new species, holotype female. 46, 47. *E. inepta* Prout. 46. Lectotype female (BMNH). 47. Lectoparatype female (BMNH). 48. *E. usta* Butler, holotype female (BMNH). All specimens in AMNH unless otherwise specified. $\times 1.2$.

curved inner margin, and dark scaling in the median area anteriorly and on both sides of the t. p. line. The male antennal segments have the basal 75 percent twice as thick as the posterior part (when viewed laterally), with the thick portion having two short pairs

of setose swellings. The palpi extend beyond the front of the eyes by a distance equal to 1.3 (males) to about 2.0 (females) the diameter of the eyes. The ventral plate has each part sharply enlarged medially. The male genitalia have the vesica with two separate

sclerotized pieces, the anterior of which has a rounded posterior end. The female genitalia have a tapered bursa copulatrix with the longitudinal striations having inwardly pointed teeth.

ADULTS: Palpi unicolorous very pale grayish brown, females slightly lighter in color than males; palpi of males extending beyond front of eyes a distance 1.3 times diameter of eyes or 0.9 mm, of females by 1.5 to 2.0 times or 0.9 to 1.1 mm. Eyes of females smaller than those of males. Antennae of males (fig. 50) with basal 75 percent of segments twice as thick as posterior part (when viewed laterally), with thick portion having two short pairs of setose swellings ventrally at anterior and posterior corners, of females shortly ciliate.

Upper Surface of Wings (fig. 2): Forewings rather broad, with pointed apex; grayish white with medium and dark brown plus some reddish brown scaling, the darker portions tending to be concentrated in median area anteriorly and on both sides of t. p. line; cross lines weakly indicated except for prominent, broad, undivided t. p. line, latter with irregular inner border, and for incomplete, lunulate s. t. line; discal dot small, blackish brown; terminal margin either not differentiated or with slender dark line, interrupted by veins; fringe with mixture of white, grayish brown, and blackish brown scales. Hind wings paler than forewings, with scattered dark scales distally; without maculation except for minute, dark, discal dot; terminal line and fringe similar to those of forewing.

Under Surface of Wings: Forewings evenly grayish brown, becoming slightly paler distally; without maculation except for small discal dot and, on some specimens, very faint indication of broad t. p. line; fringe tending to be concolorous with wing. Hind wings grayish white, with evenly distributed, sparse dark brown scales; without maculation except for small discal dot in some specimens; fringe concolorous with wing.

Length of Forewings: Males, 8.5 to 9.0 mm; females, 8.5 to 10.0 mm.

Segment VIII (fig. 76): Ventral plate with each lateral piece enlarged anteriorly, inner edges approaching each other medially, margins somewhat irregular, with inner one

shorter than outer one, narrowing posteriorly to median, sclerotized, curved rod, each apex angled inwardly and sharply pointed.

Male Genitalia (fig. 108): Uncus slightly swollen medially, apex angled ventrally, terminating in long, slender point; anellus broad, narrow, with elongate posterior arms, latter straight, angled and more heavily sclerotized apically; valves broad basally, outer margin rounded, tapering to rounded apex; aedeagus widest posteriorly, tapering anteriorly; vesica apparently with two anterior sclerotized pieces, a shorter, more or less vertical one on left having posterior end offset outwardly from longer anterior part, with longer piece on right side and dorsally, widest medially, right margin somewhat S-shaped, anterior end slender, angled to right, and with angulate posterior piece of more or less equal width, anterior end thin, rounded, posterior end pointed.

Female Genitalia (fig. 142): Bursa copulatrix elongate, slender, evenly tapering to enlarged anterior end, posterior 67 percent with widely spaced longitudinal striations, those on left side tending to be more heavily sclerotized and having more prominent inwardly pointing teeth; ductus seminalis arising on right side from posterior portion of bursa copulatrix, directly anteriorly, curving ventrally and posteriorly to make a complete loop.

TYPE: Holotype, male, USNM (not examined).

TYPE LOCALITY: 3 km south of Freirina, Atacama, Chile.

DISTRIBUTION: The Regions of Antofagasta (Antofagasta Province) and Atacama (Huasco Province). These are in the North Coast and Intermediate Desert Biotic Provinces, respectively.

Vojnits also included specimens from Coquimbo and Aconcagua in his type series, but expressed doubt that they were conspecific with the Atacama specimens.

TIME OF FLIGHT: September, October, and November.

REMARKS: Eight specimens (2 males, 6 females), one slide mount of male antennae and legs, and three genitalic dissections (one male, two females) have been studied. The AMNH material is all from Antofagasta, but it matches the original description and figures of *atacama*.

As mentioned above, Vojnits questioned the conspecificity of his own type series. It is possible that he included some specimens of the following species in his material; see my comments under Remarks for it.

Eupithecia atacamaensis, new species

Figures 3, 51, 77, 109, 143, 144

DIAGNOSIS: This species has relatively broad, pale forewings, with a broad, undivided t. p. line that is sharply defined on its inner margin but only faintly delimited outwardly. The male antennal segments have the basal 67 percent twice as thick as the distal 33 percent (when viewed laterally), and have a larger anterior and smaller posterior pair of setose projections from the thick area. The palpi extend beyond the front of the eyes by a distance of 1.0 to 1.1 (males) to 1.4 (females) times the diameter of the eyes. The ventral plate has each lateral piece curved, with a slender anterior thickening, and a hooked apex. The male genitalia have the vesica with the anterior sclerotized piece having a pointed, wedge-shaped posterior end. The female genitalia have an asymmetrical bursa copulatrix with inwardly dentate longitudinal striations.

ADULTS: Palpi pale grayish brown, darker than front; palpi of males extending beyond front of eyes a distance equal to 1.0 to 1.1 times diameter of eyes or 0.7 to 0.8 mm, of females by 1.4 times or 0.8 to 0.9 mm. Eyes of females smaller than those of males. Antennae of males (fig. 51) with basal 67 percent of segments twice as thick as distal 33 percent (when viewed laterally), flatly hexagonal in outline (when viewed dorsally), and with a larger anterior and smaller posterior pair of setose projections from the thick area, of females minutely ciliate.

Upper Surface of Wings (fig. 3): Forewings relatively broad; whitish gray with medium, dark, and reddish brown scaling, these tending to be concentrated in median area of wing, especially along inner margin of t. p. line; costa with patches of dark scales, usually indicating origins of poorly defined cross lines; discal spot round or slightly elongate, dark; t. p. line broad, prominent, undivided, outer edge poorly defined; s. t. line slender, white, partially represented; terminal line slender,

brown, tending to be interrupted by veins; fringe concolorous with wing. Hind wings paler than forewings, with scattered brown scaling distally; with partial to complete, slender, brown extradiscal line; discal dot absent; terminal line varying from complete to absent; fringe similar to that of forewing.

Under Surface of Wings: Forewings evenly grayish brown in basal part, becoming slightly paler distally; discal dot present in most specimens; t. p. line weakly represented or absent; terminal line grayish brown; fringe grayish white. Hind wings pale gray, with evenly and sparsely distributed dark brown scales; maculation usually absent, small discal dot and incomplete extradiscal line present in a few specimens; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, male, 8.5 mm; paratypes, males, 8.5 to 9.0 mm; females, 8.0 to 9.5 mm.

Segment VIII (fig. 77): Ventral plate with each lateral piece narrowly enlarged anteriorly, inner edges approaching each other medially, margins slightly irregular, with both edges of about same length, narrowing posteriorly to median, sclerotized, curved rod, each apex sharply pointed.

Male Genitalia (fig. 109): Uncus with long, tapering, curved point; anellus broad, narrow, with elongate posterior arms, latter curved, becoming more sclerotized apically; valves broad basally, outer margin rounded, tapering to rounded apex; aedeagus widest posteriorly, gently tapering anteriorly; vesica apparently with single, large, curved anterior sclerotized piece, pointed posterolaterally on left side, ventral surface rounded, broad, narrowing anteriorly, dorsal surface slender, very slightly tapering anteriorly, with anterior, slender, digitate projection, and with straight posterior piece, narrowed anteromedially, anterior end concave with strong lateral points, posterior end rounded.

Female Genitalia (figs. 143, 144): Bursa copulatrix asymmetrical, left side biconvex, posterior swelling larger than anterior one, right side slightly curved, anterior end narrowed, with rounded corneous swelling at end, posterior 67 percent with widely spaced longitudinal striations, those on left side more numerous than on right and with prominent inwardly pointing teeth; ductus seminalis

arising on right side about 33 percent distance from posterior end, directed anteriorly, curled ventrally, posteriorly and then distally.

TYPES: Holotype, male, four male and one female paratypes, Coquimbana, 25 km NE Freirina, Atacama Desert, Atacama Province, Chile, October 19–20, 1957 (L. E. Peña); one female paratype, Tongoy, S of Coquimbo, Coquimbo Province, Chile, February 4–5, 1984 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,459A, and one antennae and set of legs on FHR 19,459B. (The word Atacama was incorrectly printed "Atcama" on the labels.)

The holotype and all paratypes are in the collection of the AMNH.

DISTRIBUTION: The Regions of Atacama (Huasco Province) and Coquimbo (El Qui Province). These are in the Intermediate Desert and Coquimban Desert Biotic Provinces, respectively.

TIME OF FLIGHT: October and February.

REMARKS: Seven specimens (5 males, 2 females), one slide mount of male antenna and legs, and three genitalic dissections (one male, two females) have been studied.

This species has almost the same distribution as Vojnits gives for his *atacama*. Based on his figures, with the rounded pieces in the vesica, the symmetrical bursa copulatrix, and the even more schematic representation of the ventral plate (1985, figs. 8, 9, 15), the present species cannot be *atacama*.

ETYMOLOGY: The specific name is an adjective derived from type locality.

***Eupithecia seatacama*, new species**

Figures 4, 52, 78, 110

DIAGNOSIS: This species has broad, pale forewings, with a broad, undivided t. p. line that is sharply defined on its inner margin only, and hind wings with a dark inner border to the extradiscal line. The male antennal segments have the basal 67 percent twice as thick as the distal 33 percent (when viewed laterally), and have a slightly asymmetrical ventral surface with the setal-bearing swellings. The palpi of the males extend beyond the front of the eyes by a distance equal to the diameter of the eyes. The ventral plate has each lateral piece curved, with the widened portion strongly projecting anteromedially.

The male genitalia have the vesica with two irregularly shaped sclerotized pieces. (No females have been examined.)

ADULTS: Palpi pale grayish brown (insofar as can be told); palpi of males extending beyond front of eyes a distance equal to diameter of eyes or 0.7 mm (measured on mostly descaled palpi). Antennae of males (fig. 52) with basal 67 percent of segments twice as thick as distal 33 percent (when viewed laterally), ventral surface with posterior pair of setose projections connected medially, one side larger than other, and these connected longitudinally to smaller anterior pair.

Upper Surface of Wings (fig. 4): Forewings broad; whitish gray with medium and dark brown scaling, these concentrated in median area of wing, especially along inner margin of t. p. line; costa with patches of dark scales, usually indicating origins of poorly defined cross lines; discal spot elongate, blackish brown; t. p. line broad, prominent, undivided, outer edge very weakly defined; s. t. line obsolescent, represented by small white area at tornus; terminal line obsolescent; fringe concolorous with wing. Hind wings slightly paler than forewings, with basal and median areas brown scaled, forewing with distinct inner margin for extradiscal line, and with some pale brown scaling distally; discal spot absent; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings evenly dark grayish brown from base to faintly indicated t. p. line, then paler distally; discal spot small, elongate; terminal line and fringe similar to those of upper surface. Hind wings pale gray, with scattered dark brown scales basally and medially as far as faintly indicated extradiscal line, then paler distally; discal dot absent; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, male, 9.5 mm.

Segment VIII (fig. 78): Ventral plate with each lateral piece enlarged anteriorly, lightly sclerotized, inner margins relatively short, somewhat S-shaped with irregular margins, anteromedian projection prominent, outer margins very weakly curved for most of their length, then tapered to curved sclerotized rods, their apices short, angled, and pointed.

Male Genitalia (fig. 110): Uncus with elon-

gate, tapering, curved point; anellus broad, narrow, with prominent, curved posterior arms, each with angled apex; valves broad basally, sacculus curved, tapering to rounded apex; aedeagus with anterior 33 percent narrowed, end rounded; vesica apparently with single, large, curved anterior sclerotized piece, pointed posterolaterally on left side, ventral surface rounded, broad, narrowing anteriorly, dorsal surface slender, of equal width throughout, anterior piece continued caudally as slender, digitate projection, and with angled posterior piece, anterior portion with curved end, posterior portion widened, distal end flattened, extending slightly to right of posterior piece, and central portion of vesica having area of extremely minute spines extending about length of both sclerotized pieces.

Female Genitalia: Unknown.

TYPE: Holotype, male, El Convento, Santiago Province, Chile, October 10–14, 1961 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,564A, and one antenna and set of legs on FHR 19,564B.

The holotype is in the collection of the AMNH.

DISTRIBUTION: The Region of Valparaíso (San Antonio Province). This is in either the Coquimban Desert or Central Coastal Cordillera Biotic Provinces.

TIME OF FLIGHT: October.

REMARKS: One male, one slide mount of its antenna and legs, and one dissection of its genitalia have been studied.

ETYMOLOGY: The specific name is formed from the Latin prefix *se-*, “apart or aside,” plus the species name *atacama*, as the two species appear similar to one another in maculation.

SECTION 2

The males are characterized by having the tergite of abdominal segment VIII reduced to a slender median strip, and by the ventral plate of the same segment having a wide anterior basal portion with a more slender, variably shaped posterior extension. The valves are variable in shape, from long and slender to shorter and broader, and they may be either simple or with the sacculus having a projection. The uncus may have a single point, a

weakly developed bifid apex, or a laterally flattened, sclerotized apex with two widely separated points. The bursae copultrices of the females vary from entirely membranous with the surface spinose and symmetrical ornamentation, to a sclerotized strip between the ductus bursae and the ductus seminalis. The male antennae may be setose, trifasciculate, or with prominent conical tubercles from which setae arise.

The eyes of the females are either smaller than those of the males or of the same size. The palpi of the males project beyond the front margin of the eyes from a distance less than the diameter of the eyes to 1.4 times, while the female palpi extend for 1.0 to 2.3 times their length.

This section is divided into four groups, based primarily on the shape and ornamentation of the bursa copulatrix.

GROUP A

The females of this group have each bursa copulatrix entirely membranous, and the ductus bursae consists mainly of two parallel sclerotized lateral pieces, the structure being about twice as long as wide. The males have variably shaped ventral plates, the uncus (of the two known species) have two widely separated points that are laterally flattened, the valves have a simple, rounded sacculus, and the aedeagus has the vesica with an elongate, slender, curved sclerotized piece medially and a small basal piece.

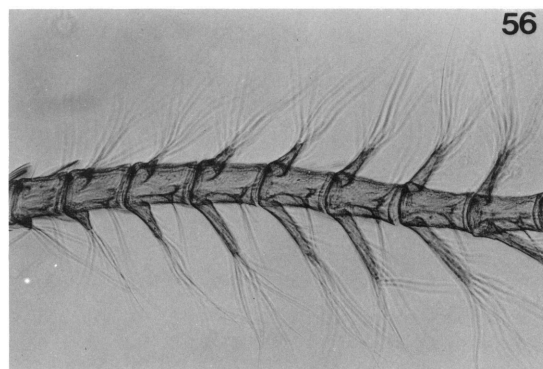
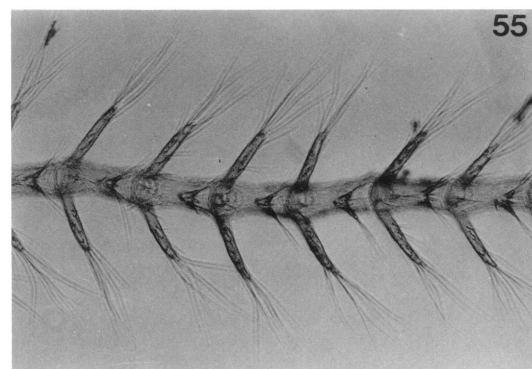
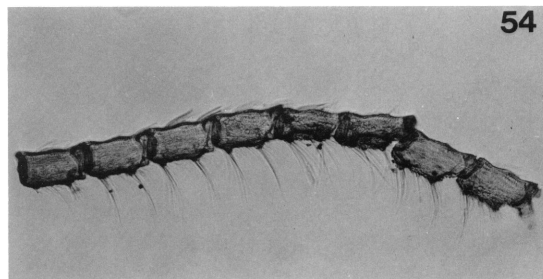
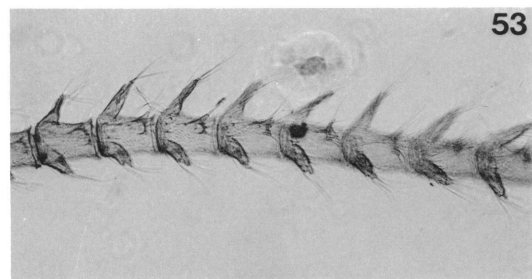
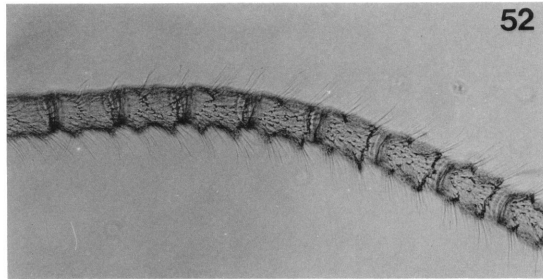
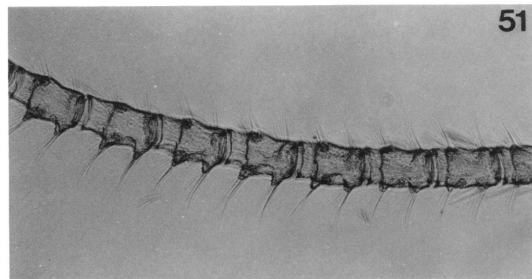
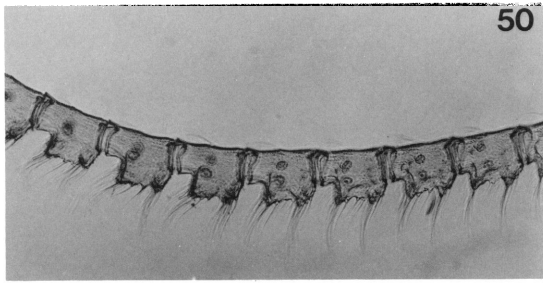
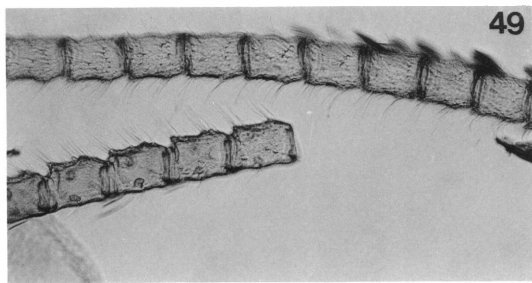
The male antennae have the appearance of being bipectinate, and the pectinations are very slightly different in their lengths on each side of the antenna. The eyes of both sexes within a species (insofar as they are known) appear to be of the same size. The palpi of the males project beyond the front margin of the eyes from a distance equal to 1.0 to 1.25 times their diameter; the female palpi extend about 1.1 times the diameter.

Eupithecia oenone Butler

Figures 5, 6, 55, 79, 111, 145, 146

Eupithecia oenone Butler, 1882: 404.

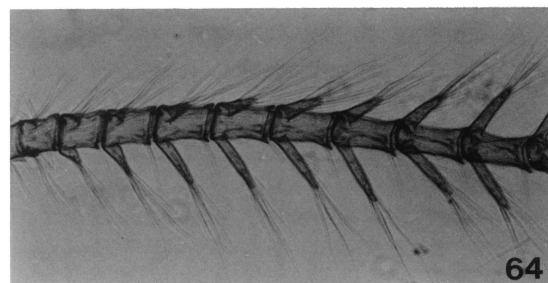
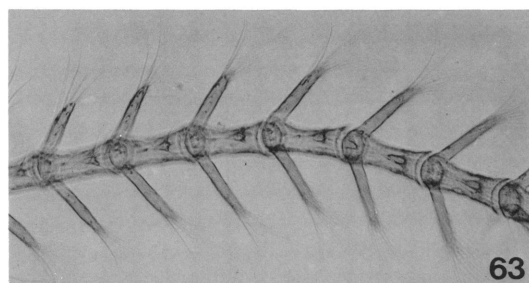
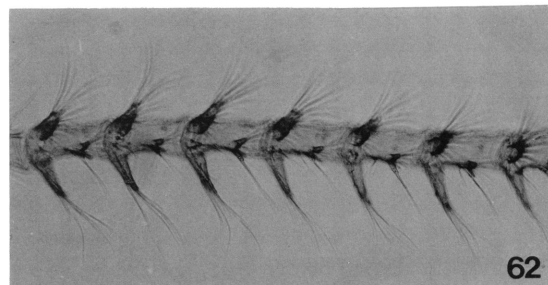
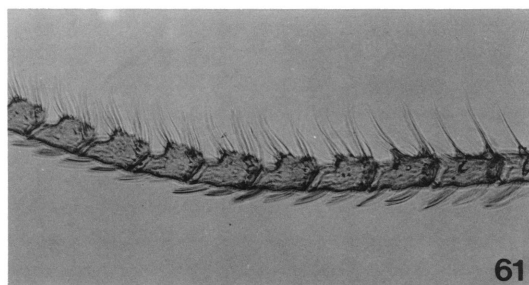
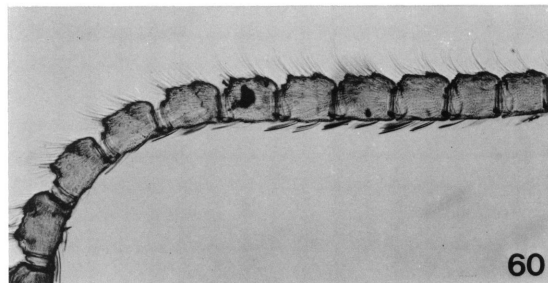
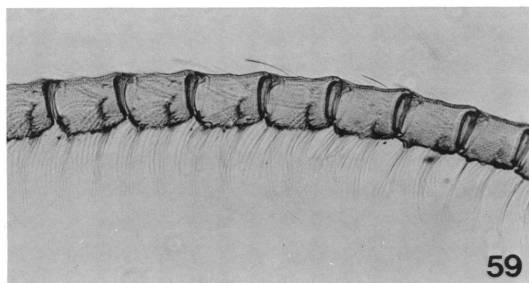
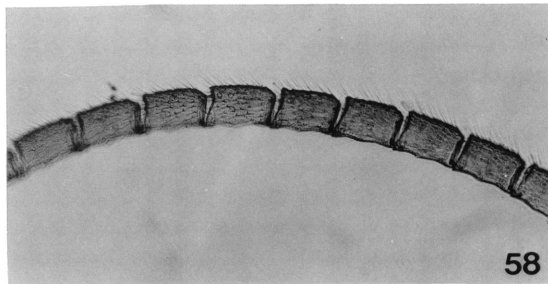
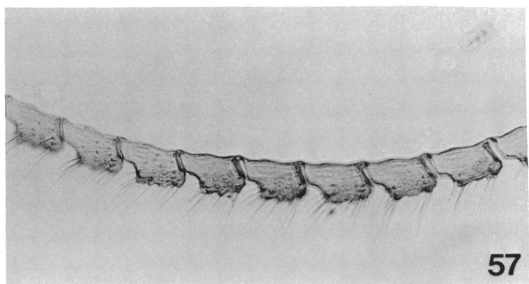
DIAGNOSIS: The wings of this species are relatively short and broad, with the white forewings having blackish brown maculation



Figs. 49–56. Male antennae of *Eupithecia*. 49. *E. osornoensis*, new species, holotype. 50. *E. atacama* (Vojnits). 51. *E. atacamaensis*, new species, holotype. 52. *E. seatacama*, new species, holotype. 53. *E. grappleri*, new species, holotype (BMNH). 54. *E. trancasae*, new species, holotype. 55. *E. oenone* Butler. 56. *E. nahuelbuta*, new species, holotype. All specimens in AMNH unless otherwise specified. Figures 47–50 photographed at twice the magnification as 51–54.

in the anterior portion of the median area and distally. The male antennal segments are

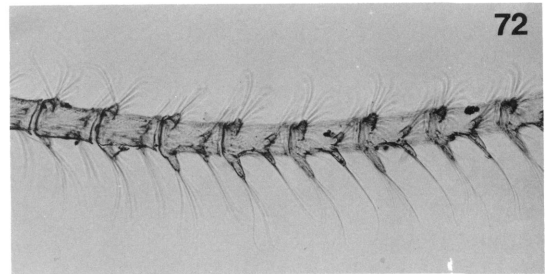
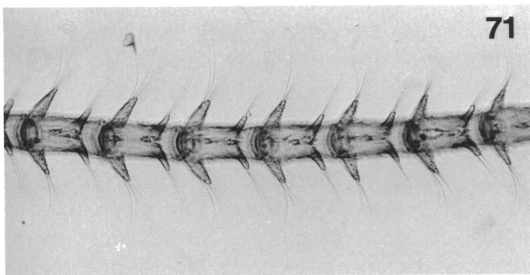
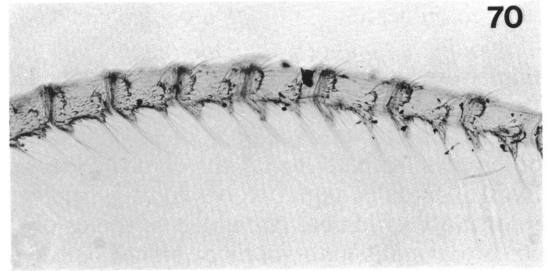
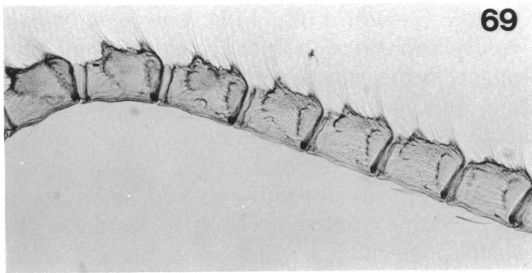
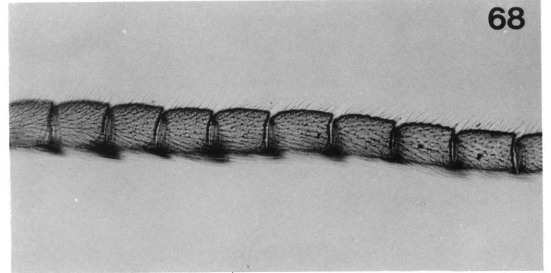
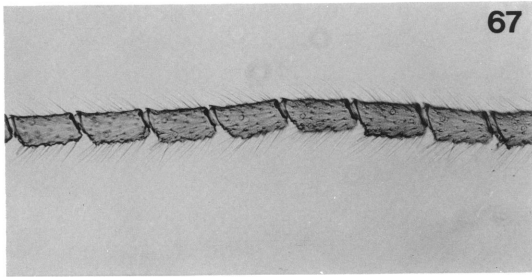
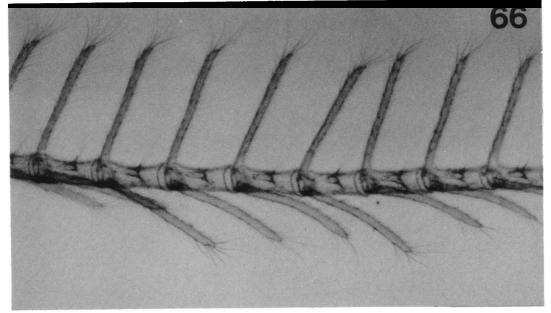
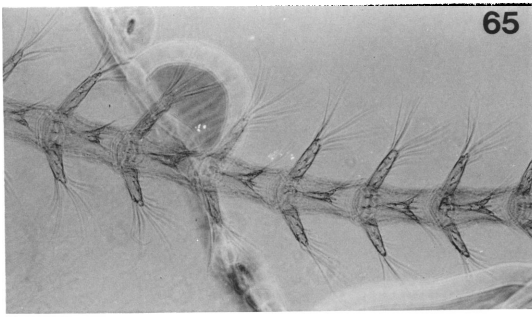
bipectinate, as the posterior pair of setose swellings are slender and longer than their



Figs. 57–64. Male antennae of *Eupithecia*. 57. *E. correana*, new species, holotype. 58. *E. malchoensis*, new species, holotype. 59. *E. spurcata* (Warren). 60. *E. curacautinae*, new species, holotype. 61. *E. canchasae*, new species, holotype. 62. *E. petrohue*, new species, holotype. 63. *E. yelchoensis*, new species, holotype. 64. *E. corralensis* (Butler), holotype (BMNH). All specimens in AMNH unless otherwise specified. All with the same magnification.

segments, with the anterior pair being rudimentary. The palpi are dark brown, and extend beyond the front of the eyes by a distance equal to 1.1 to 1.2 times the diameter

of the eyes (males) or from 1.0 to 1.4 times the diameter (females). The ventral plate is elongate and tapering, with the apex weakly enlarged with short rods. The male genitalia

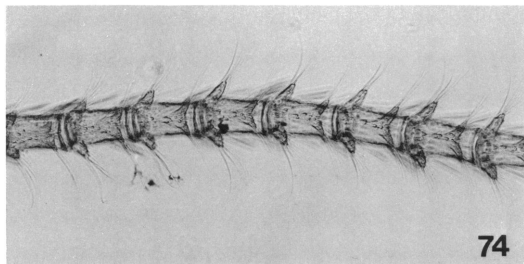
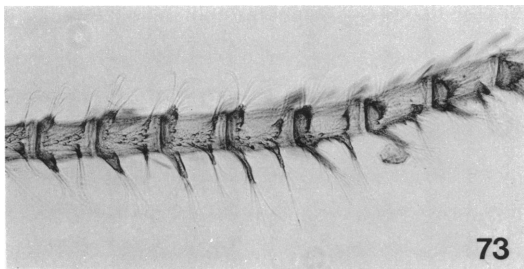


Figs. 65–72. Male antennae of *Eupithecia*. 65. *E. transexpiata*, new species, holotype. 66. *E. horismoides*, new species, paratype. 67. *E. taracapa*, new species, holotype. 68. *E. sibylla* Butler. 69. *E. picada*, new species, holotype. 70. *E. pucatrihue*, new species, holotype. 71. *E. rosalia* Butler. 72. *E. tenoensis*, new species, holotype. All specimens in AMNH, and with the same magnification.

have the vesica with a broad, curved sclerotized piece plus a rather large, angled basal piece. The female genitalia have the membranous bursa copulatrix with symmetrical,

faint, transverse areas of densely arranged spinules.

ADULTS: Palpi blackish brown, with some ventral white scaling, entire structure darker



Figs. 73, 74. Male antennae of *Eupithecia*. 73. *E. frequens* Butler. 74. *E. maule*, new species, holotype. Both specimens in AMNH, and with the same magnification.

than front; palpi of males extending beyond front of eyes a distance equal to 1.1 to 1.2 times diameter of eyes or 0.75 to 0.80 mm, of females from 1.1 to 1.3 times or 0.75 mm. Eyes of females equal to or slightly smaller than those of males. Antennae of males (fig. 55) bipectinate, with posterior pair of slender, setose swellings being 10 percent longer than their segments, and with anterior pair being rudimentary; of females shortly ciliate.

Upper Surface of Wings (figs. 5, 6): Forewings broad; white, with grayish brown scales along costa near base, a large spot before apex, and along outer margin to tornus, and with reddish brown scales in anterior part of median area and scattered along outer margin; minute traces, often one scale wide, of t. a. and median cross lines; discal spot large, of raised, dark grayish brown scales; t. p. line white, broad, with faint median dividing row of scales anteriorly, becoming indistinct posteriorly; a large dark spot before apex, causing sharp angle in t. p. line; outer portion of wing variably dark, dissected by slender, irregular, white s. t. line; terminal line dark brown, narrowly interrupted by veins; fringe of white and brown scales, more or less concolorous with terminal area. Hind wings white, with

gray and grayish black scales, with last often concentrated on veins; discal spot varying from obsolescent to prominent; maculation obscure, with trace of pale extradiscal line; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings varying from dark grayish white to grayish brown, with discal dot and faint, broad t. p. line, veins in terminal area faintly yellowish brown; terminal line grayish black; fringe white, broadly darkened opposite veins. Hind wings white, with scattered grayish brown and brownish black scales; maculation obsolescent except for discal dot; terminal line and fringe similar to those of forewings.

Length of Forewings: Males, 8.5 to 9.0 mm; females, 9.5 to 10.5 mm.

Segment VIII (fig. 79): Ventral plate with sides weakly concave, apical portion weakly enlarged, rods short, parallel, distance between their apices half their length; tergite with broad, triangular base.

Male Genitalia (fig. 111): Uncus with two widely separated points, posterodorsal one longer, more prominent than anteroventral one, and both somewhat laterally flattened; anellus broad, widening medially, with broad, curved, poorly defined arms; valves broad basally, sacculus broadly curved, tapering to rounded apex; aedeagus slightly decreasing in width posteriorly; vesica with broad, sclerotized piece, tapering posteriorly, thickened at edges, slightly curved, occupying more than half length of aedeagus, with elongate area of extremely minute spines, and with rather large, angled, sclerotized basal piece.

Female Genitalia (figs. 145, 146): Bursa copulatrix ovoid, its surface minutely dentate, with faint elongate transverse areas of densely arranged spinules laterally on both sides; ductus seminalis arising from ventral surface, extending ventrally, then curving posteriorly.

TYPE: Holotype, female, in BMNH; the genitalia are mounted on slide Geometridae 1951-314 (both examined). The holotype is in excellent condition (fig. 5).

TYPE LOCALITY: Las Zorras, the beginning of December according to Thomas Edmonds, the collector (Butler, 1882: 404). Las Zorras is (was?) a small suburb of Valparaiso (Butler, op. cit.: 340), so the type locality can probably

be considered to be Valparaíso, coastal Valparaíso Province, Chile.

DISTRIBUTION: The regions of Antofagasta (Antofagasta Province), Coquimbo (Limari Province), Valparaíso (Aconcagua and Valparaíso provinces), Maule (Curico and Cauquenes provinces), and Los Lagos (Osorno, Llanquihue and Chiloe provinces). These correspond to the Northern Coast, Coquimban Desert, Central Valley, and Valdivian Forest biotic provinces.

TIME OF FLIGHT: September, November, December, January, and March.

REMARKS: Nine specimens (3 males, 6 females), one slide mount of male antennae and legs, and seven genitalic dissections (3 males, 4 females) have been studied, including the holotype. The holotype has the least maculation on the upper surface of the forewings of any specimen before me, with most of the lower median portion of the wing being an immaculate white. The other moths show, in varying degrees of strength, a slender median cross line that extends from the discal spot to the inner margin. At first glance the holotype looks as if that portion of the forewing has been rubbed, but a microscopic examination shows that all the scales are present and in good condition. I am assuming that this difference in maculation is one of individual variation; much more material is needed before we can be certain of the range of variability in this widely ranging species.

***Eupithecia grappleri*, new species**

Figures 7, 53

DIAGNOSIS: The wings of this species are relatively short and broad, with the pale grayish white forewings having a triangular blackish brown area anterior of the discal spot and the outer area brown. The male antennal segments are bipectinate, as the posterolateral setose swellings are slender and almost as long as their segments, with the anterior pair being very small. The male palpi are a medium brown, and extend beyond the front of the eyes a distance equal to 1.15 times the diameter of the eyes. (The male's abdomen is missing; the female has not been examined.)

ADULTS: Palpi medium brown, with dark brown scaling, and with ventral edge grayish

white, entire structure darker than front; palpi of males extending beyond front of eyes a distance equal to 1.15 times diameter of eyes or 0.65 mm. Antennae of males (fig. 53) bipectinate, posterolateral setose swellings slender, almost as long as their segments, with anterior pair of swellings small.

Upper Surface of Wings (fig. 7): Forewings broad; pale grayish white, with dark brown areas on costa at base and at origin of t. a. line, a triangular blackish brown area extending from costa to small, black discal dot, and with outer portion of wings dark brown; various cross lines indicated by undulating single rows of dark brown scales, lines usually consisting of two separate rows of scales; t. p. line broadly white, basally outlined by one of abovementioned lines and distally by wide terminal area; s. t. line white, interrupted; terminal line black, narrow, interrupted by veins; fringe concolorous with wing, darkened opposite vein endings. Hind wings pale grayish white, with numerous gray and brown scales arranged in several undulating cross lines, becoming darker distally; maculation obsolescent except for small gray discal dot; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings grayish brown, with darker area along costa and distally; maculation represented by small discal dot, a pale, broad, divided t. p. line, and s.t. line; terminal line and fringe similar to those of upper surface. Hind wings concolorous with forewings, having very broad, pale extradiscal band and small, dark discal dot; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, male, 8.5 mm.

Male Genitalia: Unknown.

Female Genitalia: Unknown.

TYPE: Holotype, male, "Port Grappler, Patagonia"; I assume that this is Puerto Grappler, Magalanes, Chile (49°25'S, 74°19'W). One antenna is mounted on slide FHR 19,636.

The holotype is in the BMNH.

DISTRIBUTION: The Region of Magalanes and Antarctica Chilena (Esperanza Province); this is in the Southern Pacific Biotic Province.

TIME OF FLIGHT: Unknown.

REMARKS: One specimen (without abdo-

men) and one slide mount of one of its antennae have been studied.

The single male is in beautiful condition, with the exception of the missing abdomen. The wing length is slightly less than that of the known males in this group, and the eyes are smaller (the number of specimens is so small that this may not be too meaningful). The overall color of the upper surface of the wings is grayer, the dark triangular mark over the discal dot is smaller, and the outer area of the forewings is more gently rounded and curved, as compared with *oenone*. The antennae differ from those of the other known males of this group by having the basal pair of setose swellings thicker and shorter, and the distal pair longer along the axis of the segment.

ETYMOLOGY: The specific name is a noun in the genitive case, based on the type locality.

Eupithecia physocleora Prout

Figures 8, 147, 148

Eupithecia physocleora Prout, 1922: 261, pl. 11, fig. 8 (incorrectly given as fig. 7 in text and for caption to pl. 11).

DIAGNOSIS: The wings of this species are short and broad, with the grayish white forewings having grayish brown scaling and dark brown to blackish brown maculation. The palpi have the second segment pale brown to grayish brown with white scaling ventrally, with the third segment narrowly white basally, then brown, and they extend beyond the front of the eyes by a distance equal to 1.2 to 1.3 times the diameter of the eyes (females). The female genitalia have the membranous bursa copulatrix with a finely spinulate surface, with the ductus seminalis arising ventrolaterally towards the right side. (The males have not been examined.)

ADULTS: Palpi having second segment pale brown to grayish brown with white scaling ventrally, with third segment narrowly white basally, then brown, entire structure darker than front except for white scales; palpi of females extending beyond front of eyes a distance 1.2 to 1.3 times the diameter of eyes or 0.8 to 0.9 mm. Antennae of females shortly ciliate. Abdomen with dorsal surface of first segment having small, slender, lateral

dark brown spots mediolaterally; second (visible) segment dorsally with anterior portion broadly dark brown, having pale brown band of scaling medially, remaining segments with small dark brown spot dorsally on midline, becoming smaller posteriorly, terminal segments without spots.

Upper Surface of Wings (fig. 8): Forewings broad; grayish white, with numerous grayish brown and brown scales; costa with several subtriangular, grayish black spots; maculation pale brown, with dark brown spots on some veins, these tending to form sinuous, often double cross lines; basal, t. a., and t. p. lines present, with the last the most prominent and broadly double; small dark discal dot present; subterminal area darkened in middle of wing and at tornus; s. t. line pale, incomplete; terminal line grayish black, narrowly interrupted by veins; fringe pale, darkened opposite vein endings. Hind wings white, with numerous dark scales tending to be arranged in slender, irregular lines; discal dot obsolescent; broad extradiscal line present in posterior part of wing; subterminal area, s. t. line, terminal line, and fringe similar to those of forewings.

Under Surface of Wings: Forewings pale brown to dark grayish brown, with darker spots on costa and a faint discal dash; veins in terminal area faintly yellowish brown; terminal line grayish black; fringe white, narrowly darkened opposite veins. Hind wings grayish white, with scattered brown scales; maculation obsolescent except for dark discal dot and one or two rows of dark scales forming incomplete extradiscal and s. t. lines; terminal line and fringe similar to those of forewings.

Length of Forewings: Females, 9.0 mm.

Male Genitalia: Unknown.

Female Genitalia (figs. 147, 148): Sinus vaginalis tubular, leading in to elongate, membranous ostium bursae, at least twice as long as wide, its cephalic margin forming an elongate, laterally sclerotized ductus bursae; bursa copulatrix ovoid, ventral surface thickly covered with small indented spines except for finely rugulose anterior end, and with dorsal surface thickly covered with minute, closely set spinose indentations; ductus seminalis arising ventrally or ventrolaterally toward right side, extending ventrally, then

curved posteriorly, abruptly narrowed and continued as threadlike tube.

TYPES: Prout described *physocleora* from a series of seven females. The specimen labeled by Prout as "type" and being the one illustrated with the original description is hereby designated as the lectotype, and bears my label to that effect; its genitalia are mounted on slide FHR 19,766. The lectotype is in the BMNH.

TYPE LOCALITY: Masatierra Island, Juan Fernandez Islands, Chile.

DISTRIBUTION: Juan Fernandez Islands; it is not known whether or not this species is found on islands other than Masatierra.

TIME OF FLIGHT: March.

REMARKS: Two specimens and two genitalic preparations have been studied; one is the lectotype, and the other is in the AMNH (and is without an island designation).

There is a fair amount of variation between the lectotype and the one caught in 1975; the latter has the upper surface of the forewings much more rubbed than does the lectotype, which makes pattern and color comparisons difficult. The type specimen is a paler moth, perhaps due to its age (some species of *Eupithecia* are known to fade as they get older); the paler colors of the palpi and wings in the above description refer to the lectotype.

Attention is called to the error in the original descriptions and accompanying figure as to the correct number on plate 11; *physocleora* is no. 8 (not 7, as given); this was noted on the label of the type, perhaps by Prout himself.

***Eupithecia valdivia*, new species**

Figures 9, 149, 150

DIAGNOSIS: The wings of this species are broad, with the dark grayish black forewings having obsolescent maculation except for a prominent discal spot. The palpi are dark grayish brown with white scaling ventrally, and they extend beyond the front of the eyes a distance 1.2 times the diameter of the eyes (females). The female genitalia have the membranous bursa copulatrix with a minutely denticulate surface, with the ductus seminalis arising from the ventral surface. (The males have not been examined.)

ADULTS: Palpi dark grayish brown with white scaling ventrally, being concolorous with the brown and white scaled front; palpi of females extending beyond front of eyes a distance 1.2 times the diameter of eyes or 0.6 mm. Antennae of females shortly ciliate.

Upper Surface of Wings (fig. 9): Forewings broad, covered with a mixture of grayish white, dark brown, and brownish black scales, appearing more or less unicolorous dark grayish black; maculation obsolescent except for prominent, raised black discal spot and incomplete, divided t. p. line; s. t. line obsolescent; terminal line dull black posteriorly, represented by cellular dashes anteriorly; fringe elongate, pale, narrowly darkened opposite veins. Hind wings concolorous with forewings, paler anteriorly; maculation absent except for small gray discal dot and incomplete, white s. t. line; terminal line dull black, becoming narrowed anteriorly; fringe pale, weakly darkened opposite veins.

Under Surface of Wings: Paler than upper surface; forewings grayish white, with grayish brown and brown scaling; discal dash and faint, divided, pale t. p. line present; veins in terminal area not contrastingly colored; terminal line dark grayish brown; fringe pale, slightly darkened opposite veins. Hind wings grayish white, with grayish brown scales tending to be arranged in zigzag lines; maculation obsolescent except for dark discal dot and row of dark scales between extradiscal and s. t. lines; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, 10.0 mm.

Male Genitalia: Unknown.

Female Genitalia (figs. 149, 150): Bursa copulatrix ovoid, its surface evenly covered with minute denticulations; ductus seminalis arising from ventral surface, extending ventrally, then angled posteriorly.

TYPE: Holotype, female, Valdivia, Valdivia Province, Chile, October 5, 1964 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,484A, and one antenna and a set of legs on FHR 19,484B.

The holotype is in the AMNH.

DISTRIBUTION: The Region of Los Lagos (Valdivia Province). This is in the Valdivian Forest Biotic Province.

TIME OF FLIGHT: October.

REMARKS: One female, a slide mount of its

antenna and legs, and one genitalic dissection have been examined.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

Eupithecia nahuelbuta, new species

Figures 10, 56, 80, 112

DIAGNOSIS: The wings of this species are broad and have an attenuate apical portion, with the grayish black forewings having a prominent discal spot, followed distally by a pale area and an amorphous t. p. line. The male antennae are bipectinate, with the posterior pair of long slender lobes being as long as their segments. The pale brown palpi extend beyond the front of the eyes by a distance equal to the diameter of the eyes (males). The ventral plate is long and slender, with the two narrow points being almost as long as the plate itself. The male genitalia have the vesica with one or more elongate rods plus a two-part basal piece. (The females have not been examined.)

ADULTS: Palpi pale grayish brown with a few white scales ventrally; palpi of males extending beyond front of eyes a distance equal to diameter of eyes or 0.6 mm. Antennae of males (fig. 54) bipectinate, with posterior pair of lobes long, slender, equal in length to length of their basal segments, with anterior pair of lobes very small, thin, median, Y-shaped.

Upper Surface of Wings (fig. 10): Forewings broad, attenuate, covered with mixture of grayish white, dark brown, brownish black, and reddish brown scales, appearing more or less dark grayish black; maculation obsolescent, with grayish white scaling forming semicircle below discal dot of raised dull black scales, and with rather broad, amorphous t. p. line; terminal line dull brownish black, narrow, interrupted; fringe faintly checkered, grayish white and grayish brown. Hind wings grayish white, with scattered grayish brown and dark brown scales, with last tending to be concentrated along anal border; maculation absent except for small dark discal dot; terminal line weakly represented; fringe similar to that of forewings.

Under Surface of Wings: Forewings grayish white, with scattered grayish brown scales anteriorly and distally; maculation absent except for grayish black discal dot; terminal line

and fringe similar to those of upper surface. Hind wings similar to forewings but with fewer grayish brown scales; without maculation except for elongate grayish black discal dot.

Length of Forewings: Holotype, 9.0 mm.

Segment VIII (fig. 80): Ventral plate very slender, constricted medially, both margins sclerotized for almost entire length of plate, of equal width throughout, apices slightly divergent, pointed; tergite with triangular base, posterior portion slender.

Male Genitalia (fig. 112): Uncus with two prominent points, strongly flattened laterally; anellus subtriangular, with slender, sclerotized angulate arms; valves broad, sacculus lightly sclerotized, slightly swollen, weakly projecting for 37.5 percent length of valve, apex rounded; aedeagus with anterior edge slightly enlarged; vesica apparently with at least one elongate rod, with most of inner area densely covered with minutely spinose folds, and with a two-part, curved, sclerotized basal piece.

Female Genitalia: Unknown.

TYPE: Holotype, male, Aguas Calientes, Nahuelbuta Natl. Park, Malleco Province, Chile, 1300 m, February 1–6, 1979 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,425A, and one antenna and a set of legs on FHR 19,425B.

The holotype is in the AMNH.

DISTRIBUTION: The Region of Araucania (the Province of Malleco). This is in the Northern Valdivian Forest Biotic Province.

TIME OF FLIGHT: February.

REMARKS: One specimen, one slide mount of the male antennae and legs, and one male genitalic dissection have been studied.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

Eupithecia halosydne Prout

Figures 11, 12, 151, 152

Eupithecia halosydne Prout, 1922: 260, pl. 11, fig. 6.

DIAGNOSIS: The forewings of this species have a rather sharply pointed apex, and are pale ochraceous brown in color, having relatively little maculation. The palpi are very long and slender, with an elongate third segment, and are pale brown; in the female they extend beyond the front of the eyes by a dis-

tance equal to 2.0 times the diameter of the eyes. The female genitalia have a very long ostium bursae, and the membranous bursa copulatrix is asymmetrical. (The males have not been examined.)

ADULTS: Palpi very long and slender, pale brown, except for a few pale gray scales, with third segment faintly darker, long and clearly defined, entire structure slightly darker than front; palpi of females extending beyond front of eyes a distance equal to 2.0 times diameter of eyes or 1.15 to 1.25 mm. Antennae of females densely ciliate.

Upper Surface of Wings (figs. 11, 12): Forewings broad, with rather sharply pointed apex; pale ochraceous brown, evenly colored, with obsolescent maculation; discal dot dark brown, small; wings slightly darkened by indistinct apical streak and darkened area above tornus, and with faint indications of slightly darker venular dots between the two; terminal line grayish brown, interrupted by veins; fringe paler than wings. Hind wings slightly paler than forewings; discal dot obsolescent; maculation consisting of several wavy lines, with outer area slightly darkened; terminal line weaker than that of forewing; fringe as in forewing.

Under Surface of Wings: Grayish white, with a few scattered grayish brown scales; maculation of upper surface weakly repeated, with discal spots of all wings being the only conspicuous markings; fringe dark brown opposite vein endings.

Length of Forewings: Females, 8.0 to 9.0 mm.

Male Genitalia: Unknown.

Female Genitalia (figs. 151, 152): Sinus vaginalis large, subtriangular, or rounded, leading in to elongate, membranous ostium bursae, at least twice as long as wide, its cephalad margin forming weakly sclerotized, collarlike ductus bursae; bursa copulatrix broadly elliptical, its surface minutely dentate; ductus seminalis arising from ventral surface near ductus bursae, then curving to right side.

TYPES: All that Prout stated in his original description about the type series was "18 ♀." Of the two specimens I have examined, one was labeled by Prout as a paratype, and the other as the type; I have added my lectotype label to the latter specimen, which is in the BMNH (fig. 11). The lectotype (present des-

ignation) also bears my genitalic slide label FHR 19,738.

TYPE LOCALITY: Masatierra Island, Juan Fernandez Islands, Chile.

DISTRIBUTION: Juan Fernandez Islands; it is not known whether or not this species is found on islands other than Masatierra.

TIME OF FLIGHT: March.

REMARKS: Two females (the lectotype and a paratype) and two genitalic dissections have been studied. The figure accompanying the original description gives more detail of the maculation than does my photographs.

This species is notable in the Chilean fauna for its very long palpi; only *picada*, found on the mainland, and *inepta*, from the Juan Fernandez Islands, have palpi that may be as long.

There is some difference between my dissection (FHR 19,690) of a paratype and that of the lectotype. The former (figs. 151, 152) has a broader, flatter ostium bursae arising from a rounded sinus vaginalis than does the lectotype, which has a subtriangular sinus and a relatively slender ostium bursae. In the paratype, the bursa copulatrix is mounted so that the ductus bursae appears almost flat, and the ductus seminalis arises on the right side of an asymmetrical bursa; in the lectotype, the ductus bursae appears twisted, and the ductus seminalis arises ventromedially on a symmetrical bursa copulatrix.

GROUP B

The females of this group have each bursa copulatrix with symmetrical ornamentation, the last being either in the form of areas or strips of minute spines or setae or in elongate spines surrounding or partially encircling the areas of minute spines; the ductus bursae consists mainly of two parallel, lateral sclerotized pieces, the structures being either as wide as long or about twice as long as wide. The males have triangular to elongate ventral plates, usually with distinct posterior extensions, often about half the length of the plate. The uncus varies from a single elongate point, to a single point and an anterior swelling, to having two widely separated points that are laterally compressed; the sacculus of the valves varies from being simple and rounded to having a slight angle; and the vesica has

one or more large sclerotized pieces, a variably sized, minutely spinulate membrane, and a small sclerotized basal piece.

The male antennae range from being simple and shortly ciliate to bipectinate. The eyes of both sexes within a species are either of the same size or those of the females are smaller. The palpi of the males project beyond the front margin of the eyes for a distance less than to nearly twice the length of the eyes, or from 0.50 to 1.35 mm; the female palpi extend from the length of the eyes to 1.5 times their diameter, or from 0.60 to 1.60 mm.

Eupithecia trancasae, new species

Figures 13, 54, 81, 113, 153, 154

DIAGNOSIS: The wings of this species are relatively broad but the forewings have an attenuate apex; the basal and median areas are grayish white with a narrow costa and broad brown distal area. The male antennal segments are ciliate, without lobes; when viewed laterally, the basal portion of the segment is twice as thick as the distal third. The dark brown palpi of both sexes extend beyond the front of the eyes by a distance equal to the diameter of the eyes. The ventral plate is small, weakly sclerotized, with scarcely differentiated apical arms. The male genitalia have the uncus with a single attenuate point, the outer margin of the valve angulate, and the vesica has a single, flat, sclerotized piece plus a dual basal piece. The female genitalia have the bursa copulatrix with two, small asymmetrical areas of spines, and the median area is weakly denticulate and contains scattered, inwardly-pointing teeth.

ADULTS: Palpi dark brown, tending to be slightly paler medially, concolorous with front; palpi of both sexes extending beyond front of eyes a distance equal to diameter of eyes or 0.5 (males) to 0.6 mm (females). Eyes of both sexes of same size. Antennae of males (fig. 54) simple, ciliate, when viewed laterally, basal portion of segments twice as thick as distal third; of females shortly ciliate.

Upper Surface of Wings (fig. 13): Forewings relatively broad, with attenuate apex; white or pale grayish white, basal portion with pale grayish brown scaling, costa dark grayish brown, outer portion of wings dark grayish

brown and reddish brown; discal dot small, black; maculation with trace of median line, t. p. line with basal dark border, either a solid line or venular dots, with line itself otherwise undefined, being concolorous with median area, s. t. line white, prominent posteriorly, becoming faint anteriorly; terminal line dark brown, interrupted by veins; fringe concolorous with wing. Hind wings white, with gray and grayish brown scaling; discal spot obsolescent; extradiscal line partially indicated; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings pale gray, with grayish brown scaling; maculation obsolescent, with small discal dot and faint indication of t. p. line; terminal line and fringe similar to those of upper surface. Hind wings grayish white, with brown scaling; small discal dot and incomplete, faint extradiscal line present; terminal line and fringe similar to those of upper surface.

Length of Wings: Holotype, male, 7.5 mm; paratype, female, 8.0 mm.

Segment VIII (fig. 81): Ventral plate small, weakly sclerotized, with parallel sides, apical region scarcely differentiated into lateral arms; tergite weakly sclerotized, longer than ventral plate.

Male Genitalia (fig. 113): Uncus with single, slender, recurved point; anellus subtriangular, with curved, posterior arms enlarged at their ends; valves with outer margin angulate medially, sacculus lightly sclerotized, rodlike, straight, extending to angle of valve, apex slender; aedeagus weakly constricted medially; vesica apparently with single, flat, sclerotized piece, slightly S-shaped, with partially striate surface, and with dual sclerotized basal piece, anterior portion rounded, posteriorly narrowed and uniting with basal piece medially.

Female Genitalia (figs. 153, 154): Ductus bursae slightly wider than long; bursa copulatrix ovoid, membranous, with two small areas of sclerotized, short, thickly set, triangular teeth in anterolateral portion of bursa, one on left side situated more caudad than right one, and with median area surrounding most of bursa very weakly denticulate and having scattered, sclerotized, inwardly pointing teeth, especially to left of origin of ductus seminalis; ductus seminalis arising from ven-

tral surface in anterior half of bursa, with wide base, extending posterolaterally to right side.

TYPES: Holotype, male, Las Trancas, mountains in Chillan area, 1200 m, Ñuble Province, Chile, February 7–12, 1966 (L. E. Peña); paratype, female, Las Trancas, Ñuble Province, Chile, December 13–16, 1976 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,568A, and one antenna plus a set of legs on FHR 19,568B.

Both type specimens are in the AMNH.

DISTRIBUTION: The Region of Biobio (Ñuble Province). This is in the Northern Valdivian Forest Biotic Province.

TIME OF FLIGHT: December and February.

REMARKS: Two specimens (1 male, 1 female), one slide mount of male antenna and legs, and two genitalic dissections have been studied.

ETYMOLOGY: The specific name is a noun in the genitive case based on the type locality.

***Eupithecia cabrasae*, new species**

Figures 14, 155, 156

DIAGNOSIS: The wings of this small species are rather broad, and the distal margin is broadly curved; the grayish black forewings have a gray median area, a prominent, raised discal dot, with most of the veins in the outer portion of the wing being narrowly orange-brown. The pale grayish brown palpi of the females have white scaling ventrally, and extend 1.3 to 1.5 times the diameter of the eye in front of the eyes. The female genitalia have the bursa copulatrix with each side medially having areas of minute sclerotized spines, and the dorsal surface anteromedially has scattered, sclerotized, inwardly pointing teeth. (The males have not been examined.)

ADULTS: Palpi pale grayish brown with white scaling ventrally; palpi of females extending beyond front of eyes a distance equal to 1.3 to 1.5 times diameter of eyes or 0.6 mm. Antennae shortly ciliate.

Upper Surface of Wings (fig. 14): Forewings rather broad, with broadly curved distal margin; grayish black, with gray median area outlining triangular dark area on costa enclosing black discal dot of raised scales; t. p. line grayish white, angled anteriorly; s. t. line white, zigzag; cubital vein narrowly orange-

brown, most of veins in outer portion of wing orange-brown; terminal line black, scarcely differentiated from terminal area; fringe elongate, narrowly pale gray at base, gray and brown distally. Hind wings slightly paler than forewings, becoming darker distally; without maculation except for small discal spot and partial s. t. line; terminal line black; fringe as on forewings.

Under Surface of Wings: Forewings pale brownish gray, becoming grayish black distally; discal dot grayish black; nebulous t. p. and s. t. lines indicated; veins concolorous with wing except for very faint brown scaling in apical area; terminal line dull black, interrupted by veins; fringe grayish white, broadly grayish black opposite veins. Hind wings grayish white, with scattered grayish brown and brownish black scales; dark discal dot and irregular dark line separating extradiscal and s. t. lines; terminal line and fringe similar to those of forewings.

Length of Wings: Holotype and paratype, females, 8.0 mm.

MALE GENITALIA: Unknown.

FEMALE GENITALIA (figs. 155, 156): Ductus bursae twice as long as broad; bursa copulatrix ovoid, membranous, mediolaterally on each side with area of minute sclerotized spines, dorsal surface posteriorly and medially very weakly denticulate, median portion with scattered, sclerotized, inwardly pointing teeth; ductus seminalis arising from ventral surface, extending ventrally, then angled to left side.

TYPES: Holotype, female, Las Cabras, 1400 m, in Chillan area, SE of Recinto, Ñuble Province, Chile, December 20, 1983 (L. E. Peña); paratype, female, Las Trancas, 1200–1400 m, SE of Recinto, Ñuble Province, Chile, December 18, 1983 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,519.

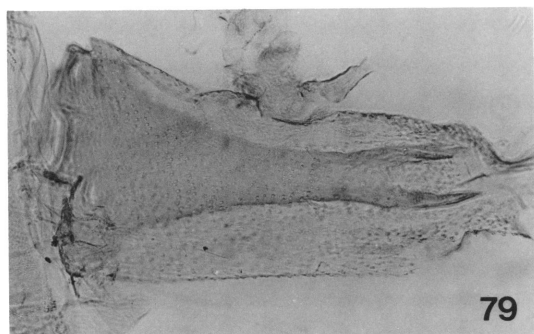
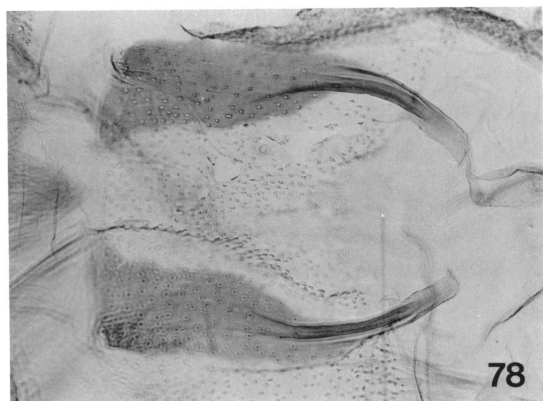
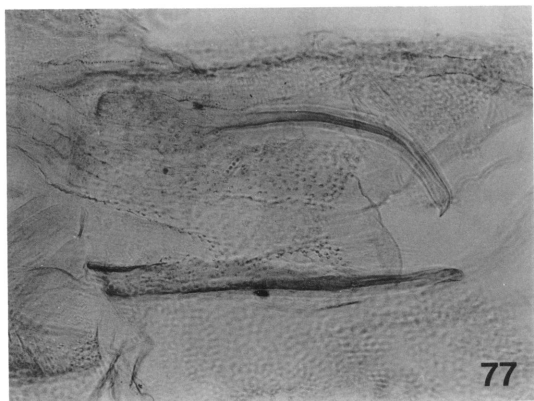
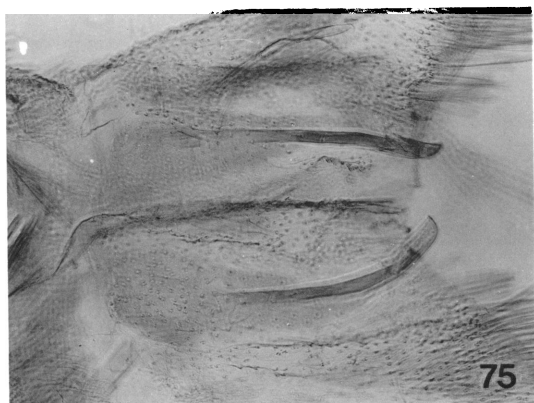
Both type specimens are in the AMNH.

DISTRIBUTION: The Region of Biobio (Ñuble Province). This is in the Northern Valdivian Forest Biotic Province.

TIME OF FLIGHT: December.

REMARKS: Two specimens (both females) and two genitalic dissections have been studied.

ETYMOLOGY: The specific name is a noun in the genitive case based on the type locality.



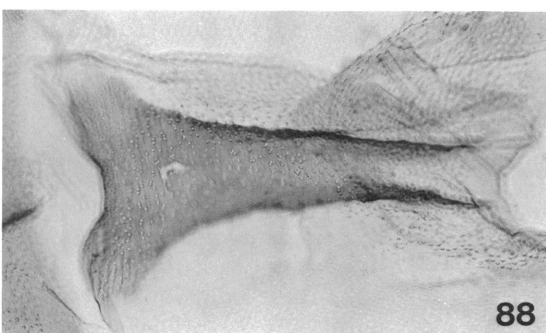
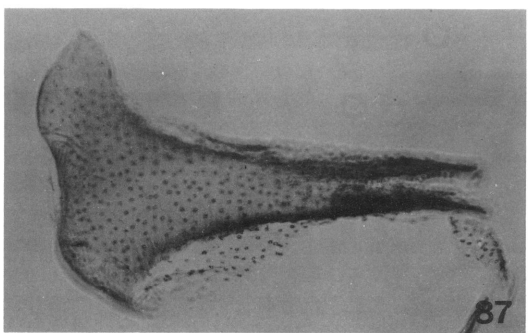
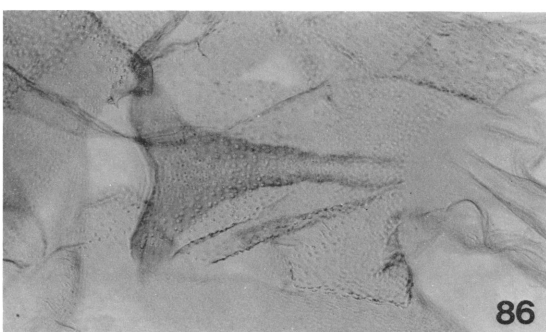
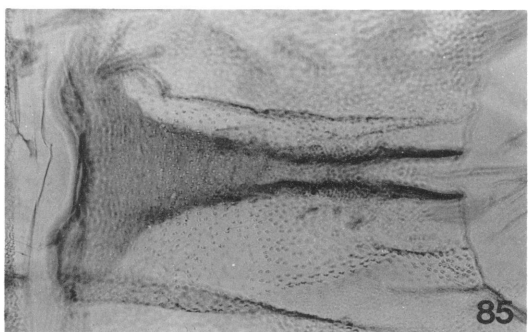
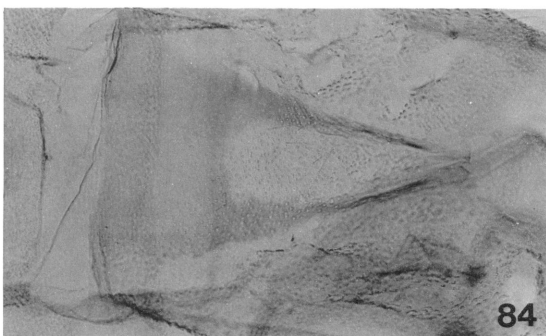
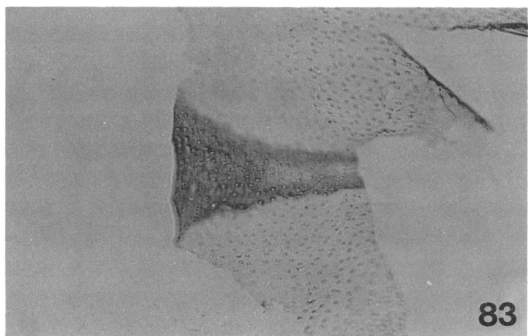
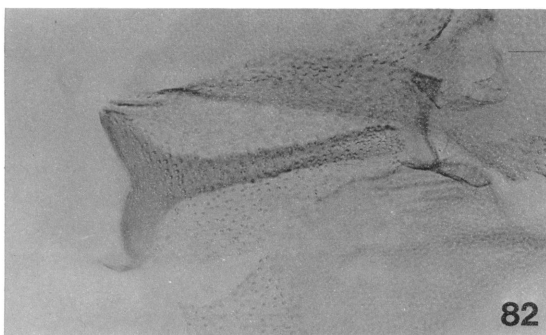
Figs. 75–80. Ventral plates of *Eupithecia*. 75. *E. osornoensis*, new species, holotype. 76. *E. atacama* (Vojnits). 77. *E. atacamaensis*, new species, holotype. 78. *E. seatacama*, new species, holotype. 79. *E. oenone* Butler. 80. *E. nahuelbuta*, new species, holotype. All specimens in AMNH.

***Eupithecia correana*, new species**

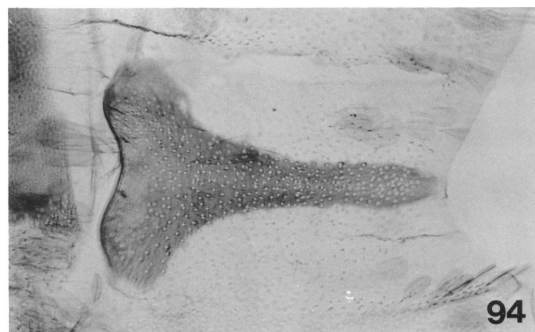
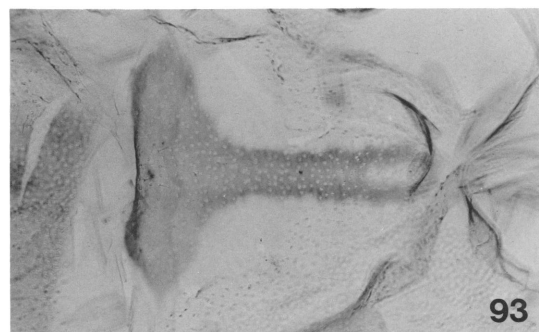
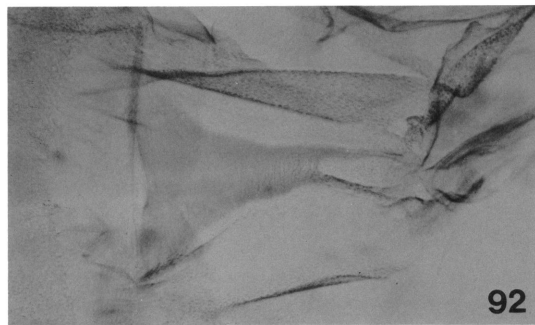
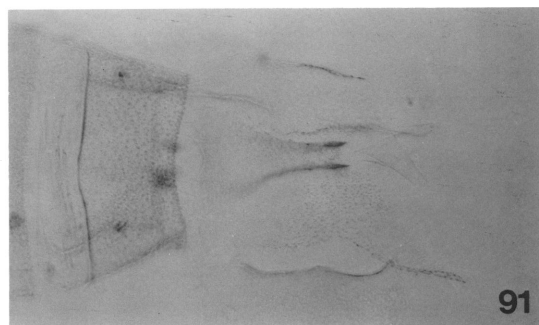
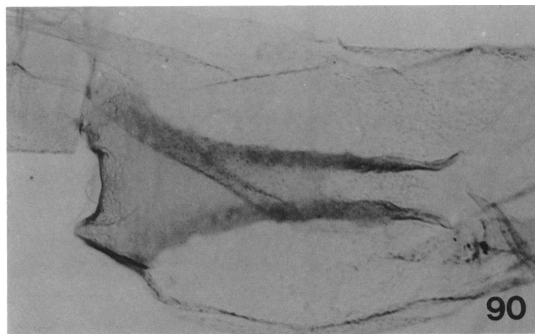
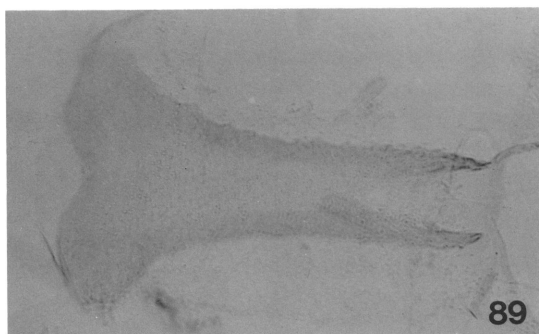
Figures 15, 57, 82, 114, 157, 158

DIAGNOSIS: The wings of this small species are attenuate, and the forewings have a white median area that contrasts with the basal and distal areas. The male antennal segments are lengthily ciliate, without lobes; when viewed laterally, the basal portion of the segment is

twice as thick as the distal third. The brown palpi extend beyond the front of the eyes by a distance equal to the diameter of the eyes (males) to 1.10 to 1.25 times (females). The ventral plate is long and slender, with short distal arms. The male genitalia have the uncus with a single attenuate point, the outer margin of the valve is curved, and the vesica has a single, posteriorly curved, sclerotized



Figs. 81–88. Ventral plates of *Eupithecia*. 81. *E. trancasae*, new species, holotype. 82. *E. correana*, new species, holotype. 83. *E. malchoensis*, new species, holotype; the ends of the arms are missing. 84. *E. spurcata* (Warren). 85. *E. curacautinae*, new species, holotype. 86. *E. canchasae*, new species, holotype. 87. *E. inexplata* Walker, holotype (BMNH). 88. *E. transexpiata*, new species, holotype. All specimens in AMNH unless otherwise specified.



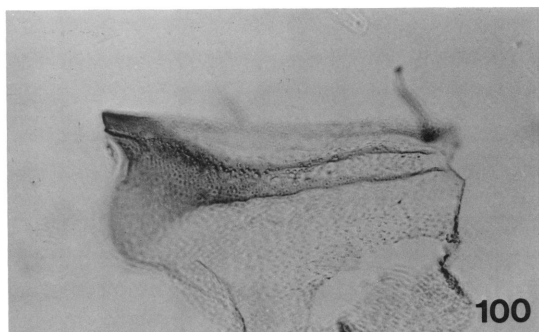
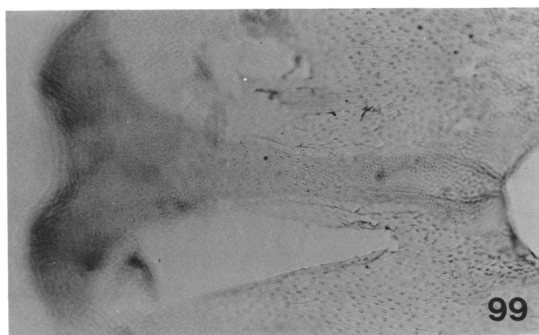
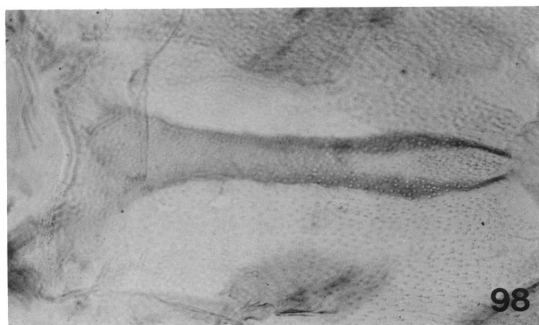
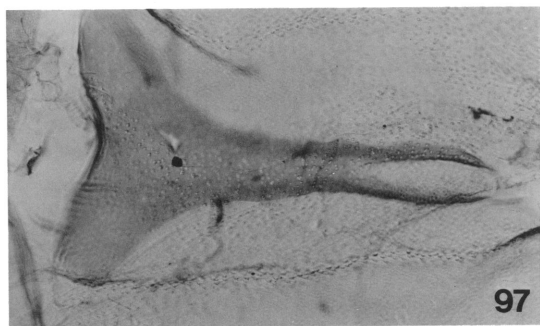
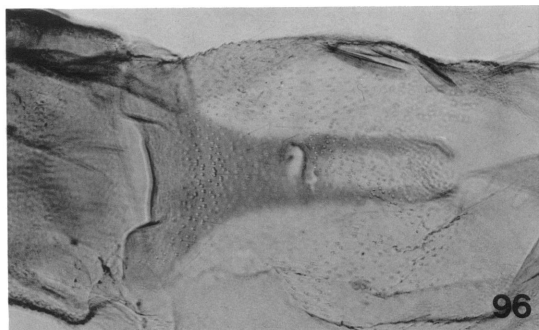
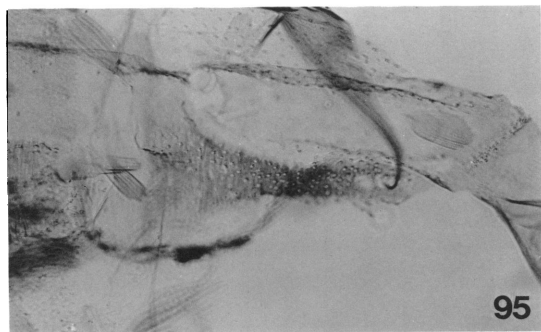
Figs. 89–94. Ventral plates of *Eupithecia*. **89.** *E. petrohue*, new species, holotype (USNM). **90.** *E. yelchoensis*, new species, holotype. **91.** *E. corralensis* (Butler), holotype (BMNH). **92.** *E. horismoides*, new species, holotype. **93, 94.** *E. sibylla* Butler. All specimens in AMNH unless otherwise specified.

piece plus a small angled basal piece. The female genitalia have the bursa copulatrix with a median constriction on the left side, and with a number of long spines in the scobinate areas.

ADULTS: Palpi covered with variable mixture of pale brown and dark brown scales, concolorous with front; palpi of males extending beyond front of eyes by distance equal to diameter of eyes or 0.6 mm, of females by 1.10 to 1.25 times or 0.6 to 0.7 mm. Eyes of females smaller than those of males. Antennae

of males (fig. 57) lengthily ciliate, without prominent lobes, when viewed laterally, basal portion of segments twice as thick as distal third; of females shortly ciliate.

Upper Surface of Wings (fig. 15): Forewings attenuate; median area white or pale grayish white, contrasting with dark brown basal area and faintly reddish brown distal area; t. a. line obsolescent, indicated primarily by change in color from basal to median areas; discal dot small, prominent, grayish black to black; t. p. line with dark brown basal border,

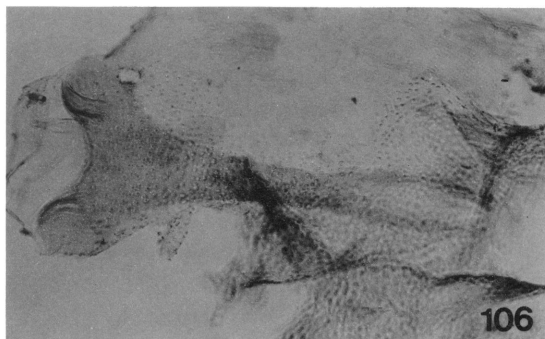
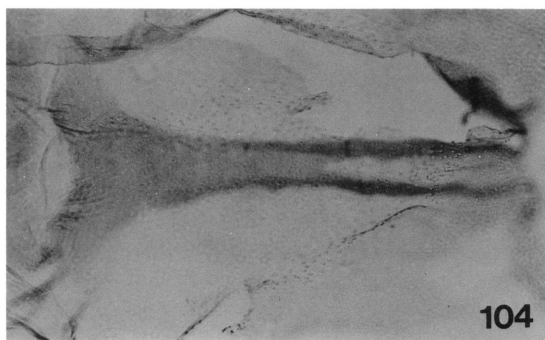
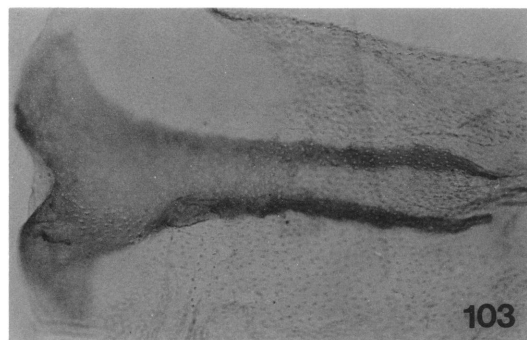
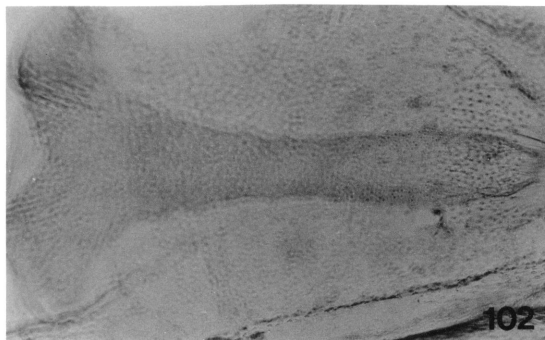
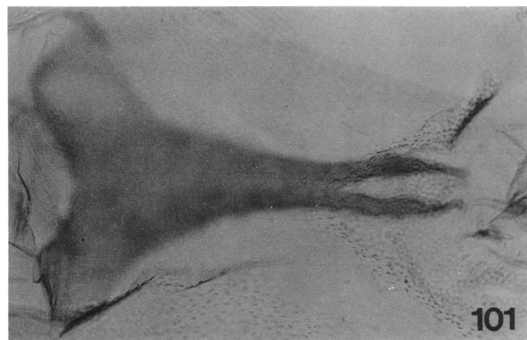


Figs. 95–100. Ventral plates of *Eupithecia*. **95.** *E. taracapa*, new species, holotype. **96.** *E. juncalensis*, new species, holotype. **97.** *E. picada*, new species, holotype. **98.** *E. pucatrihue*, new species, holotype. **99.** *E. mallecoensis*, new species, holotype. **100.** *E. tenoensis*, new species, holotype. All specimens in AMNH.

broadly curved anteriorly, then straight across remainder of wing, t. p. line pale gray, tending to be divided medially by single row of scales, becoming obsolescent medially; subterminal area and veins in outer portion of wing tending to be dull orange-brown; s. t. line white, slender, tending toward obsolescence; terminal line dull black, narrowly interrupted by veins; fringe concolorous with wing, narrowly darkened opposite veins. Hind wings grayish white, with dark brown scales basally,

pale grayish brown scales distally; discal dot small; partial extradiscal line present in some specimens; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings pale gray with grayish brown scaling; discal dot grayish brown, and with basal border of t. p. line present, t. p. line weakly indicated; terminal line grayish black, interrupted by veins; fringe similar to that of upper surface. Hind wings pale grayish white with brown scaling;



Figs. 101–106. Ventral plates of *Eupithecia*. **101–104.** *E. rosalia* Butler. **105.** *E. frequens* Butler. **106.** *E. maule*, new species, holotype. All specimens in AMNH.

maculation of upper surface weakly indicated; fringe similar to that of upper surface.

Length of Forewings: Holotype, male, 7.5 mm; paratypes, females, 7.0 to 7.5 mm.

Segment VIII (fig. 82): Ventral plate anteriorly with slender lateral areas, sharply narrowed to narrow, elongate projection, sides slightly more heavily sclerotized than median strip, apex weakly swollen, having short arms; tergite 1.5 times longer than ventral plate, anterior edge a slender sclerotized rod, me-

dially subtriangular, then narrowed, increasing in width posteriorly.

Male Genitalia (fig. 114): Uncus with single, attenuate point; anellus subtriangular, with curved, sclerotized posterior arms enlarged at their ends; valves with outer margin rounded, sacculus rounded, weakly sclerotized, short, apex slender, tapered; aedeagus narrowed medially; vesica with single, posteriorly curved piece occupying more than half length of aedeagus, its surface curved,

longitudinally striate, tapering posteriorly to point, and with small, broad, angled basal piece.

Female Genitalia (figs. 157, 158): Ductus bursae twice as long as broad; bursa copulatrix membranous, left side with constriction near middle, right side evenly rounded, anterior portion swollen, end rounded; large ventral scobinate area to left of ductus seminalis and anterior of median constriction extending laterally and nearly reaching dorsal surface, having variable number of long spines (4 to 8, 0.1 mm) anteroventrally in one group, with smaller group (2 to 4) posterolaterally, with various single or multiple spines laterally; dorsal surface with smaller scobinate area, more or less distinct from ventral area, and having long spines similar to those of ventral surface but tending to be slightly fewer in number and to be more widely distributed; ductus seminalis arising from ventral surface near middle of bursa, and extending posteriorly.

TYPES: Holotype, male, La Correana, Río Tinguiririca, 1400 m, Colchagua Province, Chile, February 14–20, 1977 (L. E. Peña). Paratypes, all from Chile and collected by L. E. Peña: same data as holotype, four females; Río Blanco, Curacautin, Andes, Malleco Province, February, 1964, one female, Río Teno, mountains of northern Curicó Province, January 24–26, 1968, one female; El Coigual, Andes, nothofagus forest, Curicó Province, January 21–25, 1964, one female; Río Blanco, Malleco Province, January 20–25, 1974, one female; Aguas Calientes, 1300 m, Nahuelbuta Natl. Park, Malleco Province, February 1–6, 1979, one female. The genitalia of the holotype, and one of its antennae, are mounted on slide FHR 19,453.

The holotype and paratypes are in the AMNH.

DISTRIBUTION: The regions of O'Higgins (Colchagua Province), Maule (Curicó Province), and Araucania (Malleco Province). These localities are in the Northern Valdivian Forest Biotic Province. One of the specimens from Curicó is labeled as being caught in a *Nothofagus* forest; these trees are some of the dominant ones in this biotic province.

TIME OF FLIGHT: January and February.

REMARKS: Ten specimens (1 male, 9 fe-

males), and six genitalic dissections (1 male, 5 females) have been studied.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

***Eupithecia malchoensis*, new species**

Figures 16, 58, 83, 115, 161, 162

DIAGNOSIS: This species has elongate, brown forewings. The male antennal segments are simple and shortly ciliate. The short brown palpi extend beyond the front of the eyes by a distance less than the diameter of the eyes (males) to slightly more than the diameter (females). The ventral plate is broad and tapering, with elongate arms. The male genitalia have an uncus with two points, and the vesica has a large, curved piece plus an inverted T-shaped basal piece. The female genitalia have the bursa copulatrix with lateral scobinate areas, each of which has longer spines around the outer edge.

ADULTS: Palpi brown or dark brown, with a few white scales ventrally, concolorous with front; palpi of male extending beyond front of eyes by a distance equal to 0.8 times diameter of eyes or 0.45 mm, of female by 1.1 times diameter or 0.6 mm. Eyes of both sexes of same size. Antennae of both sexes simple, shortly ciliate (fig. 58, male).

Upper Surface of Wings (fig. 16): Forewings elongate; brown, with grayish brown and reddish brown scaling; discal dash grayish black, elongate, encircled by narrow band of white scales; maculation obsolescent, with partial t. p. line in anterior portion of wing, apparently divided medially; s. t. line obsolescent; terminal line grayish brown, slender, interrupted by veins; fringe concolorous with wing. Hind wings pale grayish white anteriorly, with gray and blackish brown scales posteriorly; discal dash dull gray, elongate, faint; maculation obsolescent except for trace of extradiscal line in lower portion of wing; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings evenly pale brownish gray; without maculation except for elongate grayish black discal dot and trace of t. p. line; terminal line and fringe similar to those of upper surface. Hind wings grayish white anteriorly, with grayish brown

scaling posteriorly; without maculation except for discal dash; terminal line and fringe similar to those of upper surface.

Length of Forewings: Holotype, male, 8.5 mm; paratype, female, 10.0 mm.

Segment VIII (fig. 83): Ventral plate broad, tapering, with parallel arms 40 percent length of plate; tergite with broad base, posteriorly longer and wider than ventral plate.

Male Genitalia (fig. 115): Uncus with two widely separated, laterally flattened points; anellus subtriangular, with broad, curved posterior arms; valves with outer margin rounded, sacculus rounded, sclerotized, with apex broadly rounded; aedeagus short, broad; vesica apparently with a single, curved piece occupying 67 percent length of aedeagus, lateral margins appearing thicker, anterior end jagged, with median area of minutely spinulate membrane, and with inverted T-shaped, sclerotized basal piece, transverse portion rounded, longitudinal portion slender, pointed.

Female Genitalia (figs. 161, 162): Ductus bursae slightly wider than long; bursa copulatrix ovoid, membranous, with one, large, round scobinate area anterolaterally on right side, having about 12 slender spines, 0.1 mm or less in length, along anteromedian border of area, with from six to eight slightly longer, more widely spaced spines along posterior border, and with second, large, round scobinate area dorsally, partially contiguous with first area, with about 13 shorter spines along anterior margin, and with five or six slightly longer, more widely spaced spines along posterior edge; ductus seminalis arising from ventral surface near middle of bursa, extending posteriorly and angled to left.

TYPES: Holotype, male, Las Trancas, Ñuble Province, Chile, December 13–16, 1976 (L. E. Peña). Paratype, female, Fundo Malcho, mountains in Parral area, Linares Province, Chile, November 11–20, 1964 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,449.

Both type specimens are in the collection of the AMNH.

DISTRIBUTION: The regions of Maule (Linares Province) and Biobío (Ñuble Province). The two localities appear to be in the Central Valley Biotic Province.

TIME OF FLIGHT: November and December.

REMARKS: Two specimens (1 male, 1 female) and two genitalic dissections (the one of the male includes an antennae) have been studied.

ETYMOLOGY: The specific name is an adjective derived from the type locality.

Eupithecia spurcata (Warren),
new combination

Figures 17, 18, 59, 84, 116, 159, 160

Tephroclystia spurcata Warren, 1904: 88.

Neopithecia akerbergi Vojnits, 1985: 416, figs. 10–12, 16, 19, 22, pl. 2, figs. 3–6. New combination with *Eupithecia*; NEW SYNONYMY.

DIAGNOSIS: This large species has broad forewings. The male antennal segments have two pairs of small lobes per segment, each bearing very long setae. The short brown palpi extend beyond the front of the eyes by a distance equal to the diameter of the eyes (males) to 0.95 to 1.12 times (females). The ventral plate is broad, wedge-shaped, and has elongate, slender arms. The male genitalia have the uncus with an attenuate single point, and the vesica has an elongate sclerotized piece, with the small basal piece near or at the end of the sclerotized piece. The female genitalia have the bursa copulatrix with a small scobinate area on each side, each with multiple rows of short to elongate, slender spines anteromedially.

ADULTS: Palpi dark brown, with a few white scales ventrally, concolorous with front; palpi of males extending beyond front of eyes by distance equal to diameter of eyes or 0.7 mm, of females by 0.95 to 1.12 times diameter or 0.7 to 0.8 mm. Eyes of both sexes of same size. Antennae of males (fig. 59) with slender basal pair of lobes barely exceeding width of segment, distal pair much smaller, each lobe bearing very long setae; of females ciliate.

Upper Surface of Wings (figs. 17, 18): Forewings broad; brown, with gray and dark brown scaling; maculation obscure, with obsolescent, bifurcate t. a. line, a small, raised, grayish black discal dot, a pale, broad t. p. line, and a thin, white s. t. line outwardly angled in cells; terminal line dull black, narrowly interrupted by veins; fringe with basal portion darker than outer part. Hind wings grayish white anteriorly, with pale grayish scales distally and dark brown scales along anal margin; discal dot small or obsolescent; ex-

tradiscal line weakly indicated in lower portion of wings; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings brown, with costa darker; maculation of upper surface weakly repeated except for s. t. line; terminal line and fringe paler than on upper surface. Hind wings grayish white, heavily suffused with brown scales; with small discal dot and variably represented extradiscal line; terminal line and fringe similar to those of forewings.

Length of Wings: Specimens from Chiloé Island: males, 9.5 to 11.0 mm (59 specimens); females, 9.5 to 12.0 mm (25 specimens). Specimens from central mainland Chile: males, 12.0 mm (1 specimen); females, 11.0 to 13.0 mm (6 specimens).

Segment VIII (fig. 84): Ventral plate broad, wedge-shaped, evenly tapering, with elongate, slender arms almost 75 percent length of plate; tergite 1.5 times longer than ventral plate, anterior edge a slender, sclerotized rod, medially in form of shallow triangle, posterior projection elongate, parallel-sided.

Male Genitalia (fig. 116): Uncus slightly swollen posteriorly, with narrow, attenuate, curved single point; anellus subtriangular, with curved, posterior arms slightly enlarged at their ends; valves broad, with rounded outer margin and broadly rounded apex, sacculus weakly sclerotized and swollen basally; aedeagus slightly enlarged posteriorly; vesica apparently with a single weakly sclerotized piece occupying 60 percent length of aedeagus, its surface curved, with extensive membrane medially, and with small basal piece near or at anterior end of elongate sclerotized piece.

Female Genitalia (figs. 159, 160): Ductus bursae with length about equal to width; bursa copulatrix ovoid, membranous, with symmetrical, small, round scobinate areas mediolaterally, each with multiple rows of very short to elongate (0.2 mm), slender spines around anterior half of areas, spines numbering about 20 to 26 for each area; ductus seminalis arising from ventral surface near middle of bursa, extending ventrally.

TYPES: Warren described *spurcata* from an unspecified number of specimens of unknown sex; his statement on the type series, and locality, was "Common from Chili" (Warren, 1904: 88). One female, in good con-

dition, was labeled as the lectotype by D. S. Fletcher in 1948. As I have been unable to find this designation in print, I am placing my lectotype label on the same specimen in the BMNH, as I hereby name this specimen from the Rothschild Bequest (B. M. 1939-1) as the lectotype (fig. 17).

The holotype, male, of *akerbergisi* is in the USNM (not examined).

TYPE LOCALITIES: For *spurcata*, "Chili" (see preceding paragraph). The lectotype is a specimen from the population found on the mainland of Chile (not Chiloé Island), based on its very large size (see Remarks, below). It matches a specimen in the AMNH from Valparaíso very well; that locality was a collecting area for *Eupithecia* during the last century, as both Edmonds and Reed had moths from there (Butler, 1882). Accordingly, Valparaíso, Valparaíso Province, Chile is hereby designated as the type locality.

For *akerbergisi*, 1 km E Lago Tepuhueco, ca. 40 air km SW Castro, Chiloé Island, Chile.

DISTRIBUTION: The regions of Araucanía (Malleco and Cautín provinces), and Los Lagos (Valdivia, Osorno, and Chiloé provinces). Vojnits (1985) also lists "Temuco Prov.," which I have been unable to locate; from his data the locality cited may be in Malleco Province. The species appears to fly from just above sea level to about 1350 m, and occurs in both the Northern Valdivian Forest and the Valdivian Forest Biotic Provinces.

TIME OF FLIGHT: September, December, January, February, and April.

REMARKS: Ninety-three specimens (60 males, 33 females, including the lectotype), five slide mounts of antennae and legs (3 males, 2 females), and nine genitalic dissections (4 males, 5 females) have been studied.

The majority of the specimens before me are from Chiloé Island, numbering 59 males and 27 females; this population is quite uniform in size; individuals are noticeably smaller than the moths from the mainland to the north. An adequate comparison of the males cannot be made at this time, as there is but a single male before me from the latter area. See Length of Wings, above, for the range in size. The females have an average length in the Chiloé population of 10.8 mm, whereas this figure is 12.1 mm for the mainland females. The lectotype has a wing length

of 13.0 mm; because of this, I feel perfectly safe in assigning a mainland locality to this specimen.

***Eupithecia curacautinae*, new species**

Figures 19, 60, 85, 117, 163, 164

DIAGNOSIS: The wings of this small species are rather broad and attenuate, with the brownish gray forewings having a prominent discal spot and an angulate t. p. line. The male antennae have two minute pairs of ciliated lobes ventrally. The pale brown palpi extend beyond the front of the eyes by a distance equal to the diameter of the eyes (males) or 1.2 times the diameter (females). The ventral plate has two, prominent, sclerotized, apical points. The male genitalia have the uncus with two points, the sacculus is weakly S-shaped, and the vesica has several sclerotized pieces but no separate basal piece. The female genitalia have the bursa copulatrix with a weakly defined area of small denticulations on each side mediolaterally.

ADULTS: Palpi pale brown with a few scattered white scales; palpi of males extending beyond front of eyes a distance equal to diameter of eyes or 0.6 mm, of females by 1.2 times or 0.6 mm. Eyes of females smaller than those of males. Antennae of males (fig. 60) with anterior and posterior pairs of minute ciliated lobes ventrally; of females shortly ciliate.

Upper Surface of Wings (fig. 19): Forewings rather broad, with attenuate apical portion; brownish gray, with some reddish brown scales posteromedially and opposite cell in outer portion of wing; cross lines obsolescent except for sharply angled, gray, t. p. line and for faint s. t. line; discal spot prominent, black, of raised scales; terminal line grayish black; fringe concolorous with wing. Hind wings slightly paler than forewings, less irrorate with darker scales; maculation absent except for faint discal dot; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings brownish gray anteriorly, paler gray posteriorly; maculation absent except for gray, elongate discal dot; terminal line and fringe similar to those of upper surface. Hind wings grayish white, with variable number of brown scales; maculation obsolescent, with or without trace

of extradiscal line, and with dark gray discal spot slightly larger than one on upper surface; terminal line and fringe similar to those of upper surface.

Length of Forewings: Holotype, male, 7.8 mm; paratype, female, 8.0 mm.

Segment VIII (fig. 85): Ventral plate slender, with concave, weakly sclerotized sides, apical region slightly widened, with two prominent, sclerotized, slender extensions, slightly divergent apically, each apex pointed, joined by indistinct membranous area about 75 percent length of plate; tergite with wide base, broader medially than ventral plate, becoming membranous distally.

Male Genitalia (fig. 117): Uncus with two prominent points, anteroventral one larger, both laterally flattened; anellus large, with straight anterior edge, posteriorly inwardly sloping, with slender, sclerotized, curved posterior arms; valves broad, sacculus lightly sclerotized, projecting from base to 37 percent length of valve, then outer margin weakly S-shaped to slender apex of valve; aedeagus with anterior end slightly enlarged; vesica apparently with triangular piece on left side, one or more longer, thinner median pieces, with most of inner area densely covered with minutely spinose folds, and with slender, diagonal, curved, sclerotized basal piece.

Female Genitalia (figs. 163, 164): Ductus bursae twice as long as broad; bursa copulatrix ovoid, membranous, dorsal surface very weakly denticulate, mediolaterally on each side with poorly defined area of slightly stronger denticulations; ductus seminalis arising from ventral surface, extending ventrally, then angled to left side.

TYPES: Holotype, male, Río Blanco, Curacautin, Andes, Malleco Province, Chile, February, 1964 (L. E. Peña). Paratype, female, Las Trancas, 1200–1400 m, SE of Recinto, Ñuble Province, Chile, December 18, 1983 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,447A, and its antenna and legs on FHR 19,447B.

Both type specimens are in the collection of the AMNH.

DISTRIBUTION: The regions of Biobío (Ñuble Province) and Araucanía (Malleco Province). The specimens were captured in the Northern Valdivian Forest Biotic Province.

TIME OF FLIGHT: December and February.

REMARKS: Two specimens (1 male, 1 female), one slide mount of male antenna and legs, and two genitalic dissections (1 male, 1 female) have been studied.

ETYMOLOGY: The specific name is a noun in the genitive case, based on the type locality.

***Eupithecia canchasae*, new species**

Figures 59, 82, 118

DIAGNOSIS: The wings of this small species are relatively narrow and attenuate. The male antennae have a basal pair of setose lobes that extend just beyond sides of each segment plus a small median rounded lobe, the mediodistal lobes are triangular and as wide as segment. The grayish black palpi of the male extend beyond the front of the eyes by a distance equal to the diameter of the eyes. The ventral plate is small and weakly sclerotized, with two elongate, thin rods. The male genitalia have an uncus with a single recurved point, and the vesica has slender ventral and wider dorsal rods plus an elongate basal piece. (The females have not been examined.)

ADULTS: Palpi grayish black; palpi of males extending beyond front of eyes a distance equal to diameter of eyes or 0.6 mm. Antennae of males (fig. 59) with basal pair of setose lobes extending just beyond sides of segment plus small median rounded lobe, mediodistal lobes triangular, as wide as segment.

Upper Surface of Wings: Almost completely denuded of scales except for brownish black costal margin.

Under Surface of Wings: Forewings apparently grayish white with brownish costa; without discernible maculation. Hind wings slightly paler, with scattered dark scales; apparently without pattern.

Length of Forewings: Holotype, male, 7.5 mm.

Segment VIII (fig. 82): Ventral plate weakly sclerotized, small, having triangular base, then narrowed, posteriorly with uneven edges to parallel sides, median area less sclerotized than edges, apices projecting 15 percent length of plate; tergite with triangular base, elongate posterior area wider and longer than similar area of ventral plate.

Male Genitalia (fig. 118): Uncus with single, recurved point; anellus subtriangular, with

slender, sclerotized angulate arms; valves broad, sacculus scarcely differentiated; aedeagus with parallel sides; vesica apparently with slender ventral and wider dorsal rods, with most of inner area having membranous folds, and with basal piece sclerotized, anterior end rounded, flattened, posteriorly angled and slender.

Female Genitalia: Unknown.

TYPE: Holotype, male, Las Canchas, Aculeo, Santiago Province, Chile, December 10, 1983 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,590A, and its antenna and legs on FHR 19,590B.

The holotype is in the collection of the AMNH.

DISTRIBUTION: The Region of Santiago (Santiago Province). This is in the Central Valley Biotic Province.

TIME OF FLIGHT: December.

REMARKS: One specimen (male), one slide mount of antenna and legs, and one genitalic dissection have been studied.

Even though the holotype is almost entirely without scales on its wings, the species should be easy enough to recognize from the characters of the palpi, male antennae, ventral plate, and genitalia.

ETYMOLOGY: The specific name is a noun in the genitive case, based on the type locality.

***Eupithecia inexplata* Walker**

Figures 87, 119, 120

Eupithecia inexplata Walker, 1863: 1708. Fletcher, 1953: 377.

This species is known only from the holotype in the BMNH; according to Fletcher (1953: 377), it "is in poor condition." The genitalia are mounted on slide Geom: 1951-418, and have been examined. These structures, plus the ventral plate, place this species in a group of eight species that are very similar structurally. Unfortunately, seven of these are known only from single specimens, so complete comparisons cannot be made at this time.

Based on the dissection of the holotype, this species is quite similar to *transexpiata*, *petrohue*, *yelchoensis*, and *corralensis*; another two taxa in this group are known only from females (although it is possible that one of

these might be the female of *inexpiata*, but thought to be highly unlikely). Based on maculation and antennae, *semilotaria* is also included in this complex.

Segment VIII (fig. 87): Ventral plate very similar to that of *transexpiata* but differs in being larger, being 0.8 mm long, whereas *transexpiata* is 0.7 mm (in *petrohue*, 0.75 mm; in *yelchoensis*, 0.65 mm; and in *corralensis*, 0.60 mm). Apices of rods thicker and closer together than in *transexpiata*, their sclerotized sides almost coming together medially at 75 percent length of plate. Tergite broader than that of *transexpiata*, and lateral margins weakly and narrowly sclerotized.

Male Genitalia (figs. 119, 120): Uncus weakly swollen apically, with two widely separated points, the posterior one being slightly thinner and more tapering than the ventral one; anellus broad, widened medially, with prominent, two pointed posterior enlargement, and semicircular, sclerotized lateral arms; valves with maximum length (from anteromedian point to apex) 1.66 mm, maximum width 0.66 mm; basal portion concave posteriorly of sacculus and with numerous curved striations close together; outer margin evenly rounded; aedeagus with parallel sides; vesica with curved, protruding structure on left, central area apparently consisting mainly of large area of extremely minute spines, and with small, angled, sclerotized basal piece.

TYPE: Holotype, male, in BMNH; its genitalia are mounted on slide GEOM: 1951-418, and have been studied.

TYPE LOCALITY: New Zealand, according to the original description. Fletcher (op. cit.) pointed out that this was in error, and that the specimen probably came from Chile.

DISTRIBUTION: Chile.

TIME OF FLIGHT: Unknown.

REMARKS: One genitalic dissection has been studied.

The abdomenless female in the BMNH from Panguipulli, Valdivia, Chile, August 1927 (A. Fay), compared by Fletcher (op. cit.) to *inexpiata*, is thought not to be conspecific with Walker's species. There is a rather close similarity in the maculation of the five species closely allied to *inexpiata*; I expect that the adults of Walker's taxa will have a similar appearance. The female from Panguipulli appears to belong in Section 2, Group C, based

on its color and maculation; I discuss it further in the Remarks paragraph of *mallecoensis*.

Eupithecia semilotaria (Mabille),
new combination

Larentia semilotaria Mabille, 1885: 70.

DIAGNOSIS: The wings of this species are very similar to those of the following species but are larger, with a forewing length of about 10.5 mm, and are reddish brown in color on the upper surface. The male antennae are apparently simple, with long cilia. The palpi are a very dark brown, with some white scaling ventrally and at the apex. (The male genitalia, as well as the females, have not been examined.)

ADULTS: Palpi very dark brown, with pure white scaling ventrally and at apex, slender, extending beyond front of eyes of males a distance equal to 1.4 times diameter of eye or 0.8 mm. Antennae of males (based on the two remaining segments of the holotype) simple, with anterior and posterior groups of long cilia on each segment.

Upper Surface of Wings: Forewings broad; whitish, with many, slender reddish brown wavy lines crossing wing, giving the wing its basic color, and with blackish brown scaling along costa near base, at start of nebulous t. a. line; with a large costal triangular mark medially, extending inwardly to include discal dash of raised black scales, and having reddish brown scaling within triangular area; blackish brown scaling in outer portion of wing opposite cell (the apex of each wing is missing), and as a few lines at tornus; t. p. line whitish, broad anteriorly (perhaps due to being worn), becoming nebulous below costal area; s. t. line white, showing primarily at tornus, partly represented anteriorly; terminal line black or blackish brown, slender, interrupted by veins; fringe grayish brown or pale gray in basal half, grayish white distally. Hind wings contrasting in color with forewings, grayish white, with increasing number of pale gray scales distally; discal spot dark gray, elongate; anal margin with dark brown and grayish white stripes, these not extending very far onto wing; terminal line dark gray, interrupted by veins; fringe grayish white.

Under Surface of Wings: Forewings gray,

with faint reddish brown tint, becoming paler in broad costal t. p. area; maculation absent except for some dark scaling on costa, and with elongate dark gray discal dash; outer portion of wing broadly brownish gray; s. t. line whitish, straight, incomplete; terminal line dark gray, thickened medially in cells, narrowed on veins; fringe similar to that of upper surface. Hind wings white, with numerous dark grayish brown scales in form of incomplete, curved, or zigzag lines across entire wing, with these scales darker near base of wing than distally, discal spot dull black, large; terminal line and fringe similar to those of upper surface, with former a paler gray.

Length of Forewings: Estimated at 10.5 mm (neither wing is complete, and each lacks its apex).

Segment VIII: Unknown.

Male Genitalia: Unknown.

Female Genitalia: Unknown.

TYPE: Holotype, male, in Muséum National d'Histoire Naturelle, Paris. It bears the following labels: 1. Type [printed capital letters on red paper]. 2. B. Orange/Mars 83 [the first is in printed capital letters; the second line is handwritten in black ink; the label is of grayish paper]. 3. Museum Paris/Terre de feu/Hyades & Kahn 1885 [printed in three lines in capital letters on grayish paper]. 4. 2930/85 [handwritten in ink on round gray label]. 5. Larentia/semilotaria/Mab. [handwritten, on pale brown or bayish colored paper]. 6. Larentia/semilotaria Mab./Bull. Soc. Philom./1884, (7) 9, p. 70/(C. Herbulot XI-1951) [all handwritten on whitish paper]. The specimen itself is in rather poor condition, as it lacks both antennae (except for basal two segments on left side) and its abdomen. The wings on the right side are in relatively good condition, but the forewing lacks its apex and part of the outer margin; the hind wing has part of the posterior portion missing. The left forewing is without the outer third and has drooped back to cover most of the somewhat tattered left hind wing.

TYPE LOCALITY: "Ex insulis Magellanicis," according to the original description.

DISTRIBUTION: Southern Chile.

TIME OF FLIGHT: March.

REMARKS: The holotype is the only specimen examined. Due to the poor condition of the type, its relationships are uncertain; more

material is badly needed for that, as well as for the characterization of the species itself. For the time being, I have placed *semilotaria* in the *inexpiata* group, due primarily to the pattern of the upper surface of the forewings, and by the simple antennae of the male. There are some species, such as *oenone*, that have a similar wing pattern, but all the known males in Group A have pectinate antennae; the males of Group B may have either simple or pectinate antennae.

Semilotaria is the largest known species in the *inexpiata* group, with the possible exception of *inexpiata* itself. Walker (1863: 1708) gave the length of the wings of *inexpiata* as 12 lines (= one inch). Walker's type is badly worn and I have not seen it, but I have examined its genitalia; *semilotaria*, while not being in the best of condition, has been studied, but lacks its genitalia. I doubt if the two are conspecific; Walker stated that the palpi of *inexpiata* were "short, broad, obtuse"; the palpi of *semilotaria* are long and slender.

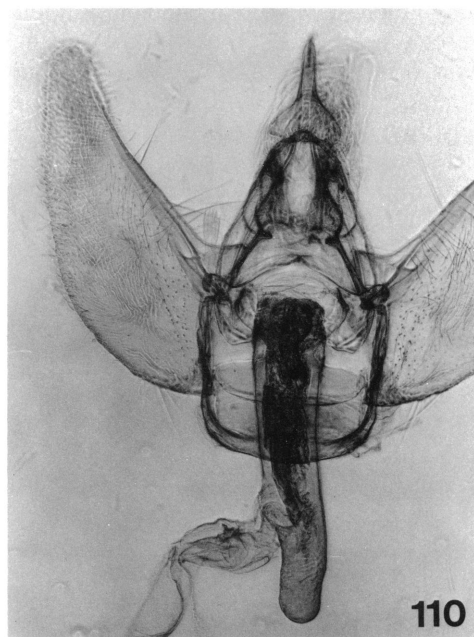
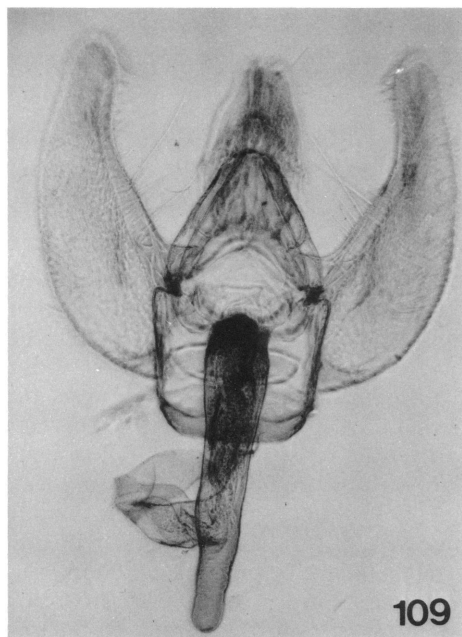
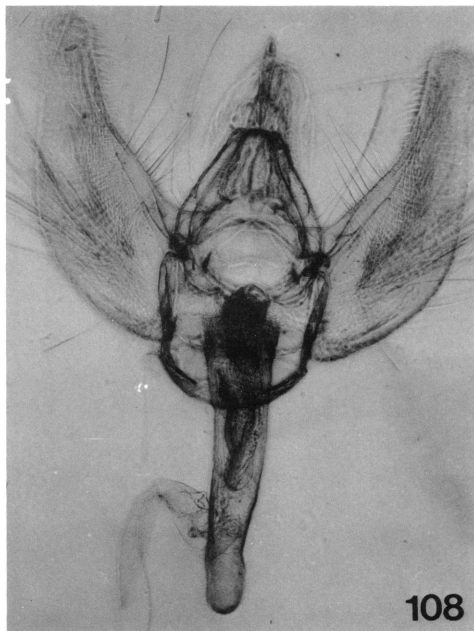
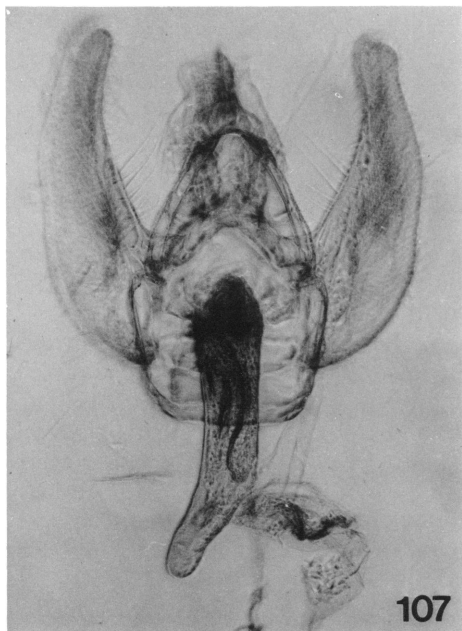
***Eupithecia transexpiata*, new species**

Figures 20, 65, 88, 125

DIAGNOSIS: The wings of this species are very similar to those of the following species but have less dark scaling on the upper surface. The male antennal segments are bipectinate, with the posterior pair of setose swellings shorter than their segments, and having elongate terminal setae. The palpi are entirely pale brown or buff, and they extend beyond the front of the eyes by a distance equal to 1.2 times the diameter of the eyes (males). The ventral plate has slightly tapered sides, with straight, sharply pointed, apical rods. The male genitalia have the vesica with an apically pointed, curved rod on the left side, and with a small angled basal piece. (The females have not been examined.)

ADULTS: Palpi entirely pale brown or buff, extending beyond front of eyes of males a distance equal to 1.2 times diameter of eyes or 0.8 mm. Antennae of males (fig. 65) bipectinate, with posterior pair of setose swellings 80 percent length of their basal segments, apically with setae as long as pectinations, and with anterior pair very small, median, sagittate, with longest pectinations 0.1 mm.

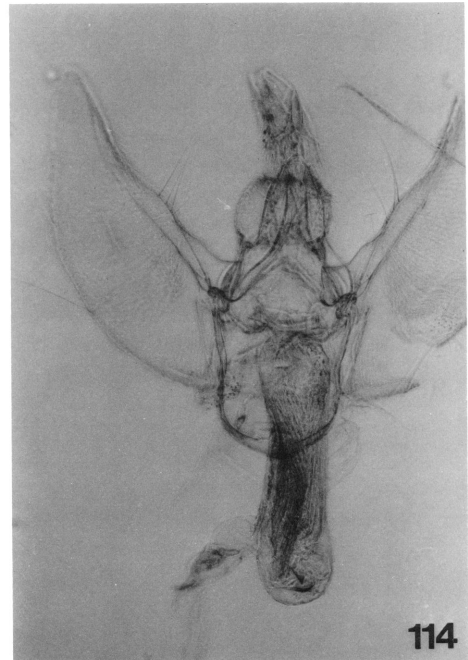
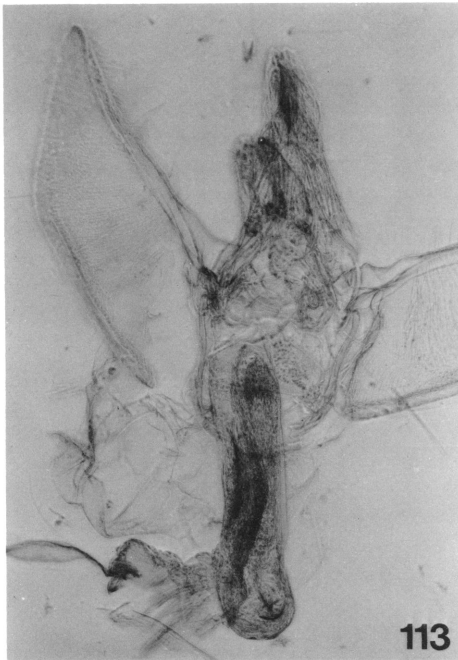
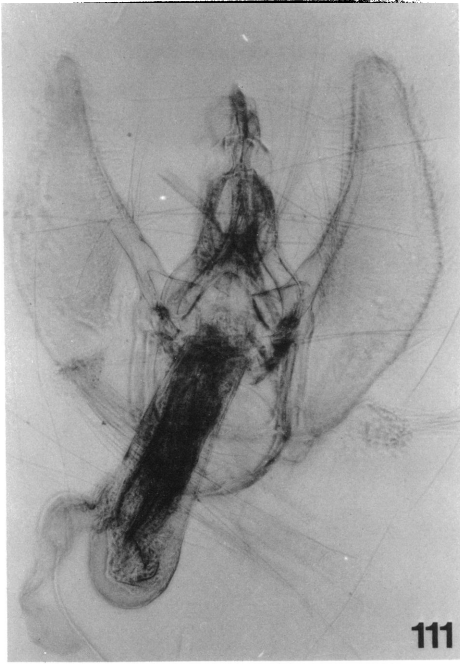
Upper Surface of Wings (fig. 20): Forewings



Figs. 107–110. Male genitalia of *Eupithecia*. 107. *E. osornoensis*, new species, holotype. 108. *E. atacama* (Vojnits). 109. *E. atacamaensis*, new species, holotype. 110. *E. seatacama*, new species, holotype. All specimens in AMNH.

broad; whitish, with brownish black areas of scales along median area of costa and below apex on outer margin; t. a. and t. p. lines present, faint; discal spot black, small, in-

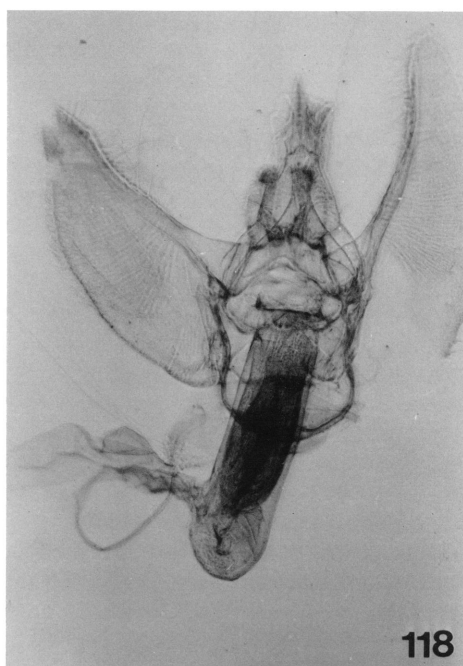
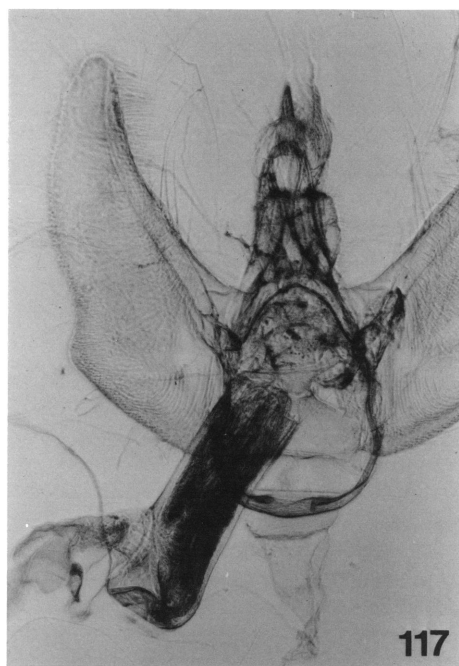
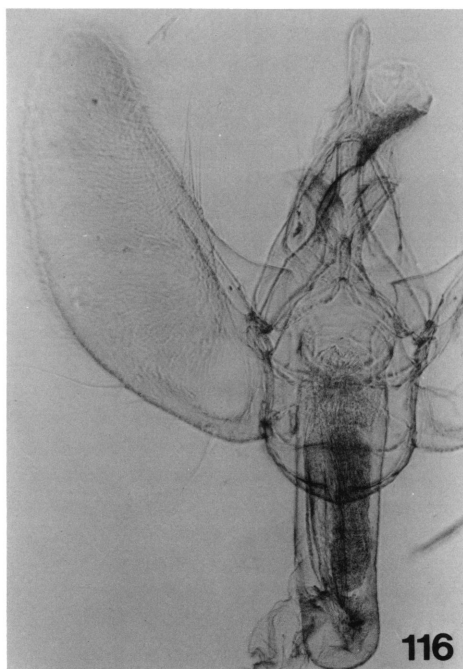
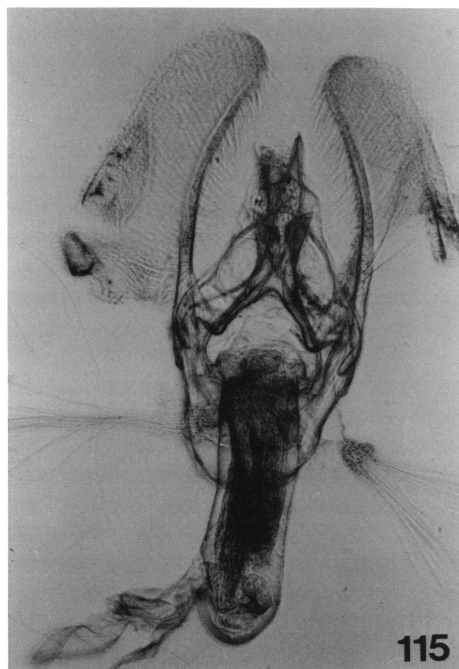
cluded in dark costal area; t. p. band broad, marked on costa, with indistinct or obsolescent outer border in lower portion of wing; s. t. line white, showing primarily in areas of



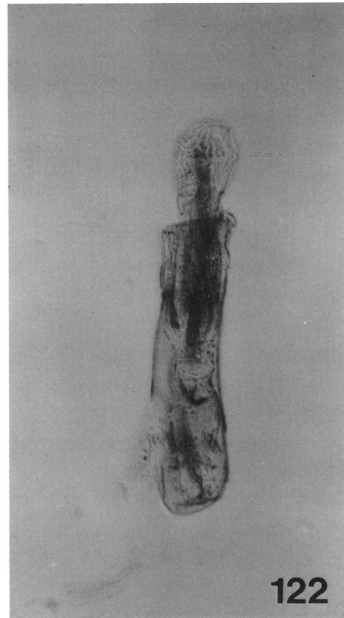
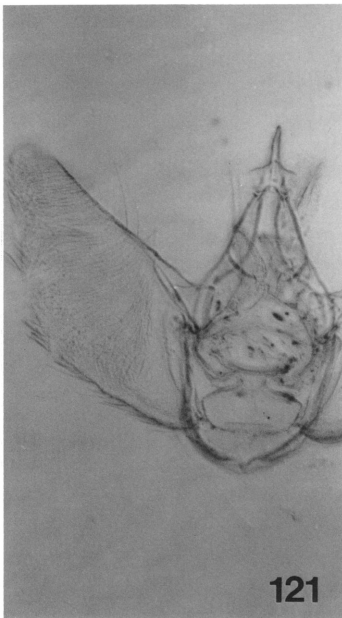
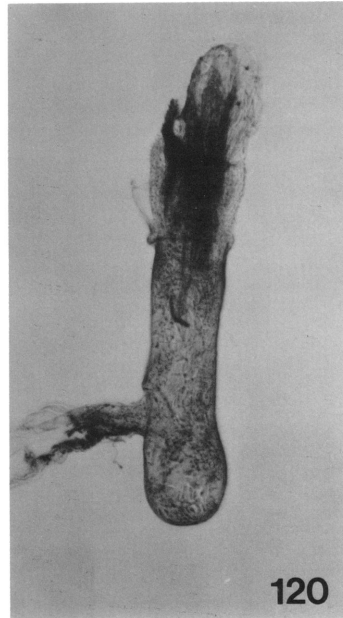
Figs. 111–114. Male genitalia of *Eupithecia*. 111. *E. oenone* Butler. 112. *E. nahuelbuta*, new species, holotype. 113. *E. trancasae*, new species, holotype. 114. *E. correana*, new species, holotype. All specimens in AMNH.

dark scaling; terminal line and fringe tending to be more or less concolorous with wing.

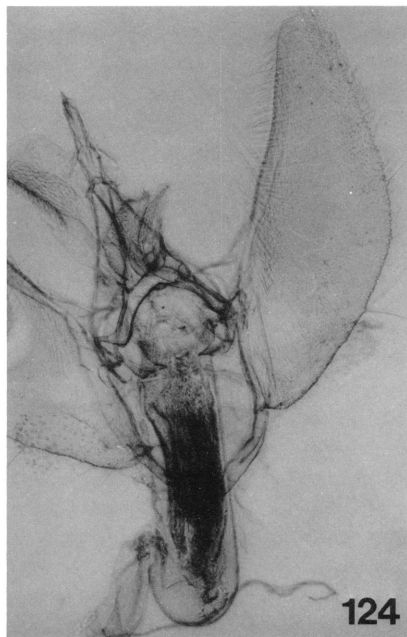
Hind wings concolorous with forewings, with increasing number of pale grayish brown



Figs. 115–118. Male genitalia of *Eupithecia*. 115. *E. malchoensis*, new species, holotype. 116. *E. spurcata* (Warren). 117. *E. curacautinae*, new species, holotype. 118. *E. canchasae*, new species, holotype. All specimens in AMNH.



Figs. 119–122. Male genitalia of *Eupithecia*. **119, 120.** *E. inexpiata* Walker. 119. Left valve. 120. Aedeagus. **121, 122.** *E. corralensis* (Butler). 121. Left side. 122. Aedeagus. All specimens in BMNH.



Figs. 123, 124. Male genitalia of *Eupithecia*. 123. *E. petrohue*, new species, holotype (USNM). 124. *E. yelchoensis*, new species, holotype. Specimens in AMNH unless otherwise specified.

scales distally; discal dot small, weakly represented; maculation obsolescent except for series of small venular dots representing extradiscal dots; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings pale grayish brown, with discal dot and indication of darkened median area on costa, with apical area and part of outer margin grayish; terminal line grayish black, interrupted by some veins; fringe grayish white, darkened opposite veins. Hind wings similar to upper surface, with more prominent discal dot and extradiscal line.

Length of Forewings: Holotype, male, 8.5 mm.

Segment VIII (fig. 88): Ventral plate 0.7 mm long, with sides weakly tapered, apices of rods widely separated, 25 percent width of base, sharply pointed, each outer edge sclerotized, almost straight, each inner edge membranous, increasing in width anteriorly, median connection rather indistinct, at 75 percent length of plate; tergite with wide base, then becoming very narrow and tapered apically.

Male Genitalia (fig. 125): Uncus with two widely separated points of equal size, laterally

flattened; anellus broad, widening medially, with prominent flared enlargement posteriorly, and semicircular, sclerotized lateral arms; valves broad, maximum length (from anteromedian point to apex) 1.33 mm, maximum width 0.50 mm, anterobasal portion slightly concave and with faint striations, basal portion of sacculus slightly swollen, outer margin of valve rounded; aedeagus slightly constricted medially; vesica with curved rod on left side, apically sharply pointed, with one or two other longitudinal rods in among elongate area of extremely minute spines, and with small, Y-shaped, sclerotized basal piece.

Female Genitalia: Unknown.

TYPE: Holotype, male, Río Gol-Gol, Puychue Lake (east), Andes, Osorno Province, Chile, February 8–11, 1957 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,455A, and one antenna and set of legs on FHR 19,455B.

The holotype is in the collection of the AMNH.

DISTRIBUTION: Los Lagos Region (Osorno Province). This is in the Valdivian Forest Biotic Province.

TIME OF FLIGHT: February.

REMARKS: One specimen, one slide mount of male antenna and legs, and one genitalic dissection have been studied.

ETYMOLOGY: The Latin prefix *trans-* has been added to the Latin *expiata*, to suggest a relationship with *inexpiata*.

***Eupithecia petrohue*, new species**

Figures 22, 62, 89, 123

DIAGNOSIS: The upper surface of the forewings are dark gray, with a dark triangular costal mark that reaches the discal dot, and with a well-defined median area. The male antennal segments are bipectinate, with the posterior pair of setose swellings short and thick, not as long as their segments, and having elongate terminal setae. The palpi are dark grayish black, and extend beyond the front of the eyes by a distance equal to 1.2 times the diameter of the eyes (males). The ventral plate has parallel sides, with the latter being sclerotized for almost all their length. The male genitalia have a broad internal structure, and a small angled basal piece. (The females have not been examined.)

ADULTS: Palpi dark grayish black, extending beyond front of eyes of males a distance equal to 1.2 times diameter of eyes or 0.8 mm. Antennae of males (fig. 62) bipectinate, with posterior pair of setose swellings short and thick, being 60 percent length of their basal segments, apically with setae almost as long as segments, and with anterior pair small but projecting at angle to segment, median, with terminal seta five times their length.

Upper Surface of Wings (fig. 22): Forewings broad; dark gray, with grayish black triangular mark on costa extending in to include black discal dot; basal area grayish black; t. a. line obsolescent; median area of wing darkened, defined basally by median line and distally by basal part of t. p. line, both lines thick, dark, and curved; subterminal area darkened opposite cell and above tornus; s. t. line pale gray, more or less complete; terminal line partly represented, when present grayish black, interrupted by veins; fringe weakly checkered, darkened opposite veins. Hind wings an even dark gray, slightly darkened along anal margin; without maculation except for small, rather obscure, discal dot; ter-

minal line nebulous, slightly darker than wing, narrowly interrupted by veins; fringe similar to that of forewings.

Under Surface of Wings: All wings dark gray; forewings with obsolescent discal dot and partial s. t. line; hind wings with more clearly defined discal dot, and with weakly represented extradiscal line; all wings with outer margin slightly darkened and narrowly interrupted by veins; fringe similar to those of upper surface.

Length of Forewings: Holotype, male, 8.5 mm.

Segment VIII (fig. 89): Ventral plate 0.75 mm long, with sides parallel, lateral margins lightly sclerotized and of even width, widening anteriorly, apices of rods pointed, almost straight, slightly more heavily sclerotized than rods, median connection indistinct, at 85 percent length of plate; tergite with wide base, then becoming very narrow and tapered apically, each side with asymmetrical small concave places.

Male Genitalia (fig. 123): Uncus with two small points, strongly laterally flattened; anellus broad, widening medially, with prominent flared enlargement posteriorly, and semicircular, sclerotized lateral arms; valves broad, maximum length (from anteromedian point to apex) 1.23 mm, maximum width 0.45 mm, anterobasal portion very slightly concave and with traces of faint striations, basal portion of sacculus weakly swollen, outer margin of valve rounded; aedeagus slightly enlarged anteriorly; vesica with broad, flattened median rod, tapering posteriorly, apparently surrounded by elongate area of extremely minute spines, and with small, approximately L-shaped, sclerotized basal piece.

Female Genitalia: Unknown.

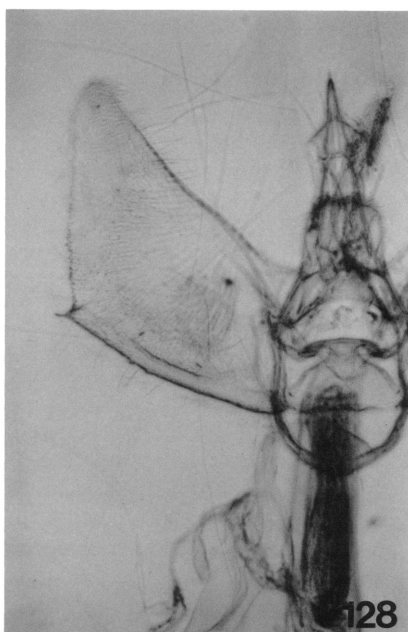
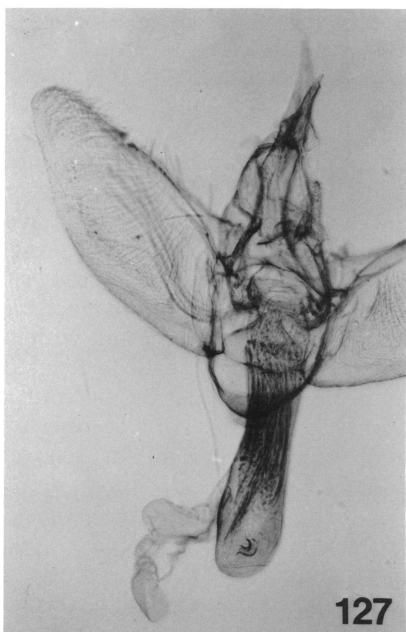
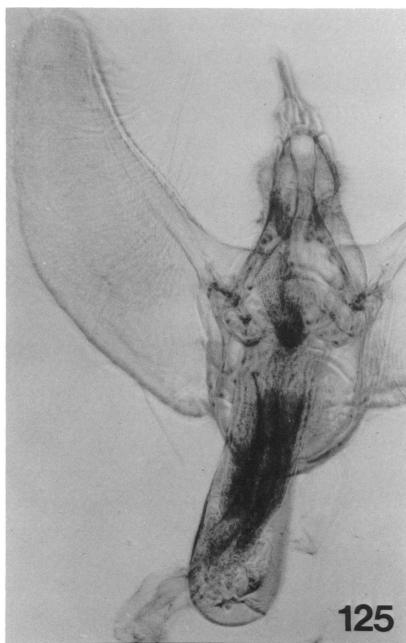
TYPE: Holotype, male, Petrohue, cerca 600 m, Llanquihue Province, Chile, January 1, 1982 (D. R. Davis). The genitalia of the holotype and one antenna are mounted on slide FHR 19,749.

The holotype is in the collection of the USNM.

DISTRIBUTION: Los Lagos Region (Llanquihue Province). This is in the Valdivian Forest Biotic Province.

TIME OF FLIGHT: January.

REMARKS: One specimen and one genitalic



Figs. 125–128. Male genitalia of *Eupithecia*. 125. *E. transexpiata*, new species, holotype. 126. *E. horismoides*, new species, holotype. 127. *E. taracapa*, new species, holotype. 128. *E. sibylla* Butler. All specimens in AMNH.

dissection (including the male antennae) have been studied.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

***Eupithecia yelchoensis*, new species**

Figures 21, 63, 90, 124, 165, 166

DIAGNOSIS: The wings of this species are short and broad, with the white to brownish

white forewings having the reduced blackish brown maculation restricted to the anterior portions of the median and marginal areas. The male antennae are bipectinate, with the posterior pair of setose swellings slender and equal in length to their segments, and the anterior pair small, median, and sagittate. The palpi are brown with blackish brown scaling, and they extend beyond the front of the eyes by a distance equal to 1.4 to 1.6 times the diameter of the eyes (females). The ventral plate has the apices of the rods divergent and sclerotized. The male genitalia have the vesica with a broad, curved rod on the left side, distally curved to the left, and with a concave apex, and a small angled basal piece. The female genitalia have the bursa copulatrix with two distinct, slightly S-shaped areas of short, sclerotized, thickly set teeth, one ventral, the other dorsal, and are connected by a rough, pitted area.

ADULTS: Palpi brown with blackish brown scaling, of females extending beyond front of eyes a distance of 1.6 times or 0.9 mm (male with head partially flattened, and palpi almost totally descaled). Eyes of females smaller than those of males. Antennae of males (fig. 63) bipectinate, with posterior pair of setose swellings slender, equal to or slightly longer than their segments, and with anterior pair small, median, sagittate; of females shortly ciliate, the ciliae being one-fourth as long as diameter of antennae.

Upper Surface of Wings (fig. 21): Forewings broad; pale brown, fading to white, with blackish brown areas of scales along costa, with small brown or grayish brown areas in median area extending from costa to dark discal spot and along outer margin below costa and above tornus; maculation obsolescent, with very slender lines marking inner and outer boundaries of median area, latter indicating basal margin of otherwise absent t. p. line; s. t. line white, dividing dark areas at tornus and below apex; terminal line dark, narrowly interrupted by veins; fringe more or less concolorous with terminal area. Hind wings white to pale grayish white, with increasing number of pale grayish brown scales distally; discal dot small, weakly represented; maculation obsolescent, extradiscal line a series of small venular dots; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings pale

grayish brown, with discal dot and indication of t. p. line, ends of veins in terminal area faintly yellowish brown; terminal line grayish black; fringe grayish white, darkened opposite veins. Hind wings pale grayish white, with scattered pale grayish brown scales; discal dot, extradiscal and s. t. lines present; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, male, 8.5 mm; paratypes, females, 8.5 to 9.0 mm.

Segment VIII (fig. 90): Ventral plate 0.65 mm long, with sides of basal half concave, then weakly tapered, apices of rods divergent, 33 percent width of base, sharply pointed and sclerotized, each outer edge broad, weakly swollen anteriorly of sclerotized portion, each inner edge membranous, increasing in width anteriorly, median connection clearly defined, at 60 percent length of plate; tergite with wide base, then becoming very narrow and tapered apically.

Male Genitalia (fig. 124): Uncus with two adjacent points of equal size, laterally flattened; anellus broad, widening medially, with prominent flared enlargement posteriorly, and semicircular, sclerotized lateral arms; valves broad, maximum length (from anteromedian point to apex) 1.2 mm, maximum width 0.45 mm, anterobasal portion scarcely concave and with very faint striations, outer margin of valve rounded; aedeagus slightly constricted medially; vesica with broad, curved rod on left side, distally curved to left, apex concave, with one or two other longitudinal rods in among elongate area of extremely minute spines, and with small, angled, sclerotized basal piece.

Female Genitalia (figs. 165, 166): Ductus bursae twice as long as broad, sclerotized portion 0.25 mm long; bursa copulatrix ovoid, membranous, with two slender, slightly S-shaped areas of sclerotized, short, thickly set, triangular teeth, one located anteriorly of ductus bursae and extending posterolaterally to left, the second dorsolaterally on left side and connected by rough, pitted area; ductus seminalis arising from ventral surface, extending ventrally, then angled posteriorly, widest at origin, tapering distally.

TYPES: Holotype, male, Río Ventisquero, Lago Yelcho, Chiloé Province, Chile, December 7, 1985 (L. E. Peña). Paratypes, both from Chile and collected by L. E. Peña: "Shangri la," Chillan area, Las Trancas, E.

of Recinto, Ñuble Province, January 19–22, 1979, one female; La Picada, 450 m, N. of Petrohue, Llanquihue Province, January 16–18, 1980, one female. The genitalia and part of the antenna of the holotype are mounted on slide FHR 19,715.

The holotype and paratypes are in the collection of the AMNH.

DISTRIBUTION: The regions of Biobio (Ñuble Province) and Los Lagos (Llanquihue and Paleno provinces). These localities are in the Northern Valdivian and Valdivian Forest Biotic provinces.

TIME OF FLIGHT: December and January.

REMARKS: Three specimens (1 male, 2 females), one slide mount of male antenna and legs, and three genitalic dissections have been studied.

A single female from Hornohuínco, 300 m, 11 km SW Lago Chapo, Llanquihue, December 29–31, 1981 (D. R. Davis), with its genitalia on slide FHR 19,780 (in USNM), is tentatively placed as this species; it is not part of the type series. The specimen is much darker than the types, as the palpi are brownish black; the upper surface of the forewings is a deep grayish black, with what appears to be a broad buff t. a. line (most of the scales are missing), a quadrate, buff costal spot at the origin of the t. p. line, the latter narrower than the costal spot, partly obsolescent and white basally, narrowly buff distally; the hind wings are an even grayish black. The under surface is also grayish black, with some of the maculation of the forewings weakly repeated, and with a dark median line crossing the hind wings. The length and shape of the palpi are the same as *yelchoensis*, and the forewings are 9.0 mm long. Based on color and pattern, this female looks very different from the type series of *yelchoensis*; based on the above-mentioned measurements and the genitalia, it is extremely similar. More material is needed before the status of this moth can be settled.

ETYMOLOGY: The specific name is an adjective derived from the type locality, with the suffix *-ensis* added.

***Eupithecia aysenae*, new species**

Figures 23, 167, 168

DIAGNOSIS: The wings of this species are short and broad, with the pale grayish brown

forewings having a prominent dark brown subtriangular area extending from the costa to include the discal spot, and a broad, dark grayish brown apical area. The palpi are covered with a mixture of brown and gray scales, and are narrowly gray ventrally; those of the females extend beyond the front of the eyes nearly 1.6 times the diameter of the eyes, or 0.9 mm. The female genitalia have the bursa copulatrix with two distinct, elongate areas of short, sclerotized, thickly set teeth, one ventrally and to the left side, the other dorsally and to the right side, with the two being connected by a rough, pitted area. (The males have not been examined.)

ADULTS: Palpi with mixture of dark brown and gray scales, narrowly gray ventrally; palpi of females extending beyond front of eyes a distance equal to nearly 1.6 times diameter of eyes, or 0.9 mm. Antennae shortly, densely ciliate, the ciliae being about one-fifth as long as diameter of antennae.

Upper Surface of Wings (fig. 23): Forewings broad; pale grayish brown, with slender (one or two scales wide), irregular, cross lines on most of wing; costa with large dark brown subtriangular area medially, about twice as long (along costa) as deep, extending to blackish brown discal spot; t. p. line arising at outer edge of triangular area, faintly flesh colored along costa, broad, angled below costa, inner margin delimited by slender dark line, with t. p. line becoming diffuse posteriorly; wing with apical area broadly dark grayish brown, extending to about cell CU_1 , then fading out except for faint darkened area at tornus; s. t. line white, incomplete; terminal line black, interrupted by veins, the black areas capped by narrow white strips; fringe gray, broadly darkened opposite vein endings. Hind wings very slightly grayer than forewings, with some pale gray scaling along inner margin, and becoming slightly darker distally; discal spot obsolescent; maculation obsolescent except for faint trace of dark extradiscal line; terminal line dark gray, otherwise it and fringe similar to those of forewings.

Under Surface of Wings: Forewings gray, darker along costa and apically; with dark scaling extending from costa to dark gray discal spot; origin of t. p. line a rectangular buff spot, with remainder of t. p. line obsolescent; apical area similar to that of upper surface; s. t. line reduced to small grayish white spots;

terminal line of arcuate spots between veins, dark gray, without outer white scaling of upper surface; fringe similar to that of upper side. Hind wings pale gray, with dark brown scales forming inner and outer boundaries of extradiscal line; discal spot brown; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, female, 9.5 mm.

Segment VIII: Unknown.

Male Genitalia: Unknown.

Female Genitalia (figs. 167, 168): Ductus bursae less than twice as long as broad, sclerotized portion 0.20 mm long; bursae copulatrix ovoid, membranous, with two areas of sclerotized, short, thickly set, triangular teeth, each area enlarged at one end and tapering to other end, one located with swollen area anterior of origin of ductus seminalis and extending posterolaterally to left, the second dorsally, with enlarged area to right, tapering medially, the two connected on dorsal surface by rough, pitted area; ductus seminalis arising from ventral surface, base not enlarged, extending ventrally or slightly to left, then angled posterodorsally, entire structure thin, 0.075 mm wide, of equal width to apex.

TYPE: Holotype, female, Lago Frio, Coyhaique, high Andes, Aysen Province, Chile, January 20–31, 1961 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,552.

The holotype is in the collection of the AMNH.

DISTRIBUTION: The Region of Campo (Coyhaique Province). This is probably in the Aysen Cordillera Biotic Province.

TIME OF FLIGHT: January.

REMARKS: One specimen (female) and one genitalic dissection have been studied.

ETYMOLOGY: The specific name is a noun in the genitive case, based on the type locality.

Eupithecia anticura, new species

Figures 24, 169

DIAGNOSIS: The wings of this species are short and broad, with the forewings being gray, with a prominent black discal dot at the apex of a blackish costal triangular marking, a broad white t. p. line, and a complete grayish black outer portion of the wings. The female palpi are blackish brown, and have a

white apex; they extend beyond the front of the eyes by a distance equal to 1.3 times the diameter of the eyes, or 0.75 mm. The female genitalia have the bursa copulatrix with two distinct, slightly S-shaped areas of short, sclerotized, thickly set teeth, one ventral, the other laterally on the left side, and are connected by an area of smooth membrane. (The males have not been examined.)

ADULTS: Palpi blackish brown, with a white apex; palpi of female extending beyond front of eyes a distance equal to 1.3 times the diameter of the eyes, or 0.75 mm. Antennae shortly and densely ciliate, the ciliae between one-third and one-half as long as diameter of antennae.

Upper Surface of Wings (fig. 24): Forewings broad; grayish white, with numerous dark gray and black scales, and with flesh colored scales along veins, especially basally and distally; costa with blackish spots marking origins of basal and t. a. lines, with broadly triangular spot incorporating black discal dot; median area of wing with several narrow, scalloped cross lines; t. p. line broad, partially geminate, faintly flesh colored on costa, then whitish, complete; outer portion of wing grayish black to black, reduced in cell CU_1 , and divided by complete, white s. t. line; terminal line black, interrupted by some veins; fringe grayish white, black at vein endings. Hind wings dark gray, with pale gray scaling; discal dot grayish black, small, with slender, pale line extending from it to inner margin; extradiscal line broad, tending to be obsolescent; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings gray, being darker gray or grayish black along costa and as dark band between t. p. and s. t. lines; discal spot grayish black, elongate; veins pale gray distally; terminal line and fringe similar to those of upper surface. Hind wings gray, traversed by pale gray lines; discal spot grayish black; outer margin of wing darkened, without definite terminal line; fringe as on upper surface.

Length of Forewings: Holotype, female, 8.5 mm.

Segment VIII: Unknown.

Male Genitalia: Unknown.

Female Genitalia (fig. 169): Ductus bursae less than twice as long as broad, sclerotized portion 0.20 mm long; bursae copulatrix

ovoid, membranous, with two weakly curved areas of sclerotized, short, thickly set, triangular teeth, one located anteriorly of ductus bursae and ductus seminalis and situated diagonally, the second in left wall of bursa, extending ventrally, the two connected by area of smooth membrane; ductus seminalis arising from ventral surface, base scarcely enlarged, extending posterolaterally to left, then sharply curved to right, entire structure thick, 0.1 mm wide, of almost equal width up to wedge-shaped apex.

TYPE: Holotype, female, Anticura, on Río Golgol, Puyehue, Osorno Province, Chile, January 1–6, 1986 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,724.

The holotype is in the collection of the AMNH.

DISTRIBUTION: The Region of Los Lagos (Osorno Province). This is in the Valdivian Forest Biotic Province.

TIME OF FLIGHT: January.

REMARKS: One specimen (female) and one genitalic dissection have been studied.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

Eupithecia corralensis (Butler),
new combination

Figures 25, 64, 91, 121, 122

Helastia corralensis Butler, 1882: 406.

DIAGNOSIS: The males of this species are very similar to the males of *transexpiata* in the structure of the antennae, ventral plate, and male genitalia, and in the length of the palpi. This species can be recognized by the upper surface of all wings being a uniform dark brown; the forewings have a rectangular orange-buff spot that marks the origin of the t. p. line, and an incomplete row of white dots forming the s. t. line. (The females are unknown.)

ADULTS: Palpi medium to dark brown; palpi of males extending beyond front of eyes a distance equal to nearly 1.4 times diameter of eyes or 0.8 mm. Antennae of males (fig. 64) bipectinate, very similar to those of *transexpiata*.

Upper Surface of Wings (fig. 25): Forewings broad; dark brown to blackish brown, over grayish white scaling, latter forming several, very slender, irregular lines; maculation ob-

solescent; a small black distal spot; t. p. line with origin in costa marked with prominent, square or trapezoidal, orange-buff spot, with remainder of t. p. line obsolescent; s. t. line indicated by incomplete row of white dots; terminal line black, narrowly interrupted by veins; fringe dark grayish brown. Hind wings brownish gray, with indistinct maculation indicated by gray scaling; discal dot small, grayish black; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings grayish brown, becoming darker distally, with discal dot, two slender pale areas on costa anteriorly of discal dot, and prominent area at origin of t. p. line; s. t. line, terminal line and fringe similar to those of upper surface. Hind wings gray, with brown scaling; dark elongate discal dot present; broad, divided, scalloped extradiscal line present, and with faint indication of s. t. line; terminal line and fringe similar to those of upper surface.

Length of Forewings: Male, 8.0 mm (holotype).

Segment VIII (fig. 91): Ventral plate 0.6 mm long, with sides concave, apices of rods parallel, 20 percent width of base, separated by membranous area equal to width of one rod, each rod evenly sclerotized, tapering to sharp point, median connection rather indistinct, at about 85 percent length of plate; tergite with wide base, sharply narrowed, then tapered apically.

Male Genitalia (figs. 121, 122): Uncus with two moderate, widely separated points of equal size, laterally flattened; anellus broad, scarcely widened medially, with short median enlargement, and semicircular, sclerotized lateral area; valves broad, basal portion flat and with only a trace of striations; sacculus weakly indicated basally, outer margin rounded; aedeagus slightly swollen anteriorly; vesica with wide, elongate, tapering piece dorsally, its sides thickened, apically concave, with narrower, median, ventral piece extending posteriorly to left side.

Female Genitalia: Unknown.

Type: Holotype, male, in BMNH (fig. 24); the genitalia are mounted on slide Geom: 1951-297.

TYPE LOCALITY: Corral, Valdivia Province, Chile.

DISTRIBUTION: The region of Los Lagos

(Valdivia Province). This is at the northern end of the Valdivian Forest Biotic Province.

TIME OF FLIGHT: February.

REMARKS: One specimen (the holotype), one slide mount of one of its antennae, and one genitalic dissection have been studied.

It was because of the pectinate antennae that Butler named this species in the New Zealand genus *Helastia* Guenée. The antennae of this species and of *transexpiata* are very similar; the central ridge on the ventral surface of those of *transexpiata*, leading to the posterior pair of setose swellings, is more strongly developed in Walker's species. The length of the eyes of the males of *corralensis* are 0.6 mm (0.7 mm in *yelchoensis*) and the length of the forewing is 8.0 mm (8.5 mm in *transexpiata* and *yelchoensis*).

***Eupithecia horismoides*, new species**

Figures 26, 66, 92, 126, 170–172

DIAGNOSIS: This is the largest known species of the genus in Chile. The male antennae are bipectinate, with the pectinations being twice the length of their basal segments. The palpi are covered with a mixture of dark brown and pale gray scales, and extend beyond the front of the eyes by a distance equal to 1.6 to 1.8 times the diameter of the eyes (males) to 1.9 to 2.4 times (females). The ventral plate has two well-defined, apically sclerotized, tapered arms. The male genitalia have the vesica with several very long slender rods and a small curved basal piece. The female genitalia have a very long ostium bursae and ductus bursae, the bursa copulatrix is weakly spinose posteriorly, and the ductus seminalis has a very wide base.

ADULTS: Palpi with mixture of dark brown and pale gray scales; palpi of males extending beyond front of eyes a distance equal to 1.6 to 1.8 times diameter of eyes or 1.10 to 1.40 mm, of females a distance of 1.9 to 2.4 times or 1.35 to 1.60 mm. Eyes of females smaller than those of males. Antennae of males (fig. 66) bipectinate, with posterior pair of setose swellings slender, twice as long as their basal segments, and with anterior pair rather small, median, sagittate; of females shortly ciliate, the ciliae being half as long as diameter of antennae.

Upper Surface of Wings (fig. 26): Forewings

broad; brown, with irregular cross lines ochraceous brown; t. a. line broad, varying from partially present to complete, with slender scale line extending down middle; discal spot round, of raised grayish black scales; median area variably colored and marked, usually delimited by dark outer border of t. a. line and more prominent inner border of t. p. line, and having several slender, irregular cross lines; t. p. line broad, pale, angulate below costa, then parallel to outer margin for entire width of wing; outer portion of wing with elongate, slender black cellular dashes, having s. t. line more (females) or less (males) complete, strongest on cellular dashes; terminal line dark, slender; fringe with basal half dark, outer portion paler. Hind wings grayer than forewings, with basic pattern of latter repeated; discal dot small or absent; extradiscal line complete, most prominent part of maculation; s. t. line weakly represented or obsolescent; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings dark grayish brown, with diffuse discal spot and indication of broad t. p. line; outer portion of wing with elongate black cellular dashes, having some grayish white scales as remnant of s. t. line; terminal line and fringe similar to those of upper surface. Hind wings slightly paler than forewings, with discal dot and prominent inner line to broad, pale extradiscal band; outer portion of wing paler than basal and median areas, otherwise similar to that of upper surface.

Length of Forewings: Holotype, 16.0 mm; male paratypes, 14.0 to 15.5 mm; female paratypes, 14.5 to 16.5 mm.

Segment VIII (fig. 92): Ventral plate 0.8 to 0.9 mm long, with lateral margins of basal half concave, distal half parallel, apices of rods separated by 25 percent width of base, rods sclerotized, straight, with rounded tips, median connection clearly defined, between half and two-thirds length of plate; tergite with very wide and shallow base, sharply narrowed to form slender, parallel-sided digitate process about one-third longer than ventral plate.

Male Genitalia (fig. 126): Uncus with two widely separated points, somewhat laterally flattened, posterior one rounded or attenuate and curved ventrally, ventral one elongate,

larger than posterior one, tapering; anellus broad, widened medially, with prominent flared enlargement posteriorly extending as two broad, flat curved arms; valves broad, maximum length (from anteromedian point to apex) 1.85 mm, maximum width 0.70 mm, anterobasal portion slightly concave and with faint striations, basal portion of sacculus slightly swollen, outer margin of valve rounded, very finely irregular in outline; aedeagus with parallel sides; vesica with several slender, slightly curved, elongate rods in among area of extremely minute spines, and with slender, curved, sclerotized basal piece.

Female Genitalia (figs. 170–172): Sinus vaginalis large, subtriangular, leading in to elongate, membranous ostium bursae, 0.75 mm long, quite narrow, its anterior margin enlarged to form elongate, slender ductus bursae, 0.40 to 0.60 mm long, with lateral margins thickened; bursa copulatrix elliptical, with dorsal and lateral surfaces posteriorly minutely and densely spinose, and with anterior end covered with irregular and minute lobes or swellings; ductus seminalis with very wide base, occupying almost entire width of bursa posteroventrally, then tapering to form broad, elongate tube extending posteriorly to near middle or posterior end of ductus bursae.

TYPES: Holotype, male, Anticura, on Río Golgol, east of Puyehue, Osorno Province, Chile, October 18–29, 1985 (L. E. Peña). Paratypes, all from Chile and collected by L. E. Peña: same data as holotype but dated December 28–31, 1985, 350 m, one male, January 5–10, 1986, one male and one female; Aguas Calientes, Puyehue National Park, Osorno Province, February 10–22, 1979, one male, March 5–7, 1984, two males, one female; Pucatrihue, Osorno Province, February 10–20, 1985, two females; Lago Chapo, Llanquihue Province, December 22–28, 1985, one female; Guabún, west of Ancud, Chiloé Province, January 13, 1981, one female; Tepuhueco, southwest of Chonchi, Chiloé Province, March 3, 1984, one female; Lago Yelcho, Río Ventisquero, Chiloé Province, December 7, 1985, two males; Lago Tepuhueico, SW of Chonchi, Chiloé Island, Chiloé Province, December 11–15, 1985, one female. The genitalia of the holotype are mounted on slide FHR 19,733.

The holotype and paratypes are in the collection of the AMNH.

DISTRIBUTION: The Region of Los Lagos (the provinces of Osorno, Llanquihue, and Chiloé). These localities are in the Valdivian Forest Biotic Province.

TIME OF FLIGHT: October, and December through March.

REMARKS: Sixteen specimens (8 males, 8 females), one slide mount of male antenna and legs, and four genitalic dissections (2 males, 2 females) have been studied.

The female genitalia are basically similar to those of *halosydne*, presently placed in Section 2A (above). It may be necessary to change the position of Prout's species when males of it become known.

ETYMOLOGY: The specific name is formed from the generic name *Horisme*, with the Greek suffix *-oides*, meaning resembling or having the form of. With a superficial glance this species might be mistaken for a member of *Horisme*.

GROUP C

The females of this group have each bursa copulatrix with a sclerotized strip extending between the ductus bursae and the ductus seminalis. The ductus bursae consists mainly of two, more or less parallel, sclerotized lateral pieces, the structure varying in length from about equal, to about twice as long as wide. The males have long, slender ventral plates, often weakly swollen apically, and with relatively short and rather weakly defined posterior extensions. The uncus terminates in two points, usually widely separated and laterally flattened. The sacculus of the valves may be rounded, or with a projection that varies from being slender and pointed, to elongate, broad, and apically rounded. The vesica has one or more sclerotized pieces and a small sclerotized basal piece.

The male antennae may be simple and shortly ciliate, or have two pairs of ventral processes of varying length, symmetrical or asymmetrical, that bear elongate setae. The eyes of the females within each species are smaller than those of the males. The palpi of the males project beyond the front margin of the eyes for a distance that ranges from being less than that of the length of the eyes to about

1.4 times their length; the female palpi extend from being slightly longer to 2.3 times the diameter.

***Eupithecia taracapa*, new species**

Figures 27, 67, 95, 127

DIAGNOSIS: The dark gray forewings of this species are slender and have an attenuate apex. The male antennae are simple and shortly ciliate. The short gray palpi of the males extend beyond the front of the eyes by a distance equal to the diameter of the eyes. The ventral plate is long and slender, with very short apical arms. The male genitalia have an angulate outer edge of the valve, and the vesica has a broad, curved, sclerotized piece, with a small, C-shaped basal piece. (The females have not been examined.)

ADULTS: Palpi dark gray, with a few scattered gray scales laterally and ventrally, being concolorous with front; palpi extending beyond front of eyes by distance equal to diameter of eyes or 0.5 mm. Antennae simple (fig. 6), without lobes, shortly ciliate.

Upper Surface of Wings (fig. 27): Forewings slender, with attenuate apex; gray, with numerous dark gray, grayish brown, and grayish black scales, appearing dark gray; maculation weakly indicated, with diagonal cross lines subparalleling outer margin; discal dot small, black, raised; t. p. line broad, divided medially by single row of scales, slightly irregular in course; s. t. line obsolescent; terminal line dull black, broad, narrowly interrupted by veins; fringe gray, narrowly darkened opposite veins. Hind wings pale grayish white, pale gray distally, grayish black along anal margin; discal dot obsolescent, weakly showing through wing from under surface; incomplete extradiscal line represented; terminal line dark gray; fringe concolorous with wing.

Under Surface of Wings: Forewings evenly gray except for darker costa; discal spot small, dark gray; maculation obsolescent, weakly represented along costa and partial t. p. line; terminal line dull gray, narrowly interrupted by veins; fringe concolorous with wing, slightly darkened at ends of some veins. Hind wings slightly paler than forewings; discal dot small, dark; partial extradiscal line present; terminal line similar to that of forewings but narrower; fringe concolorous with wing.

Length of Forewings: Holotype, male, 9.0 mm.

Segment VIII (fig. 95): Ventral plate with slender base, posterior extension slender, lightly sclerotized, parallel-sided, apical arms short, 20 percent length of plate; tergite 1.3 times longer than ventral plate, anterior base narrow, posterior extension tapering, slender.

Male Genitalia (fig. 127): Uncus with two widely separated, sclerotized, laterally flattened apical points; anellus subtriangular, with curved posterior arms; valves with lightly sclerotized sacculus rounded or weakly angulate, apex broadly rounded; aedeagus weakly constricted medially; vesica apparently with at least one broad, curved, sclerotized piece more than half length of aedeagus, with slender, pointed rod anteriorly, median area with convoluted membrane, and with small, C-shaped, sclerotized basal piece.

Female Genitalia: Unknown.

TYPE: Holotype, male, Quebrada de Ti-mae, 3400 m, NE of Codpa, Taracapa Province, Chile, November 12, 1983 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,570A, and one antenna and set of legs are on FHR 19,570B.

The holotype is in the collection of the AMNH.

DISTRIBUTION: The Region of Taracapa (Arica Province). This is either in the Northern Desert or the Northern Andean Cordillera Biotic Provinces; with the specimen being caught at 3400 m, it could well be the latter biotic province.

TIME OF FLIGHT: November.

REMARKS: One specimen (the holotype male), and one slide mount of antenna and legs have been studied.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

***Eupithecia sibylla* Butler**

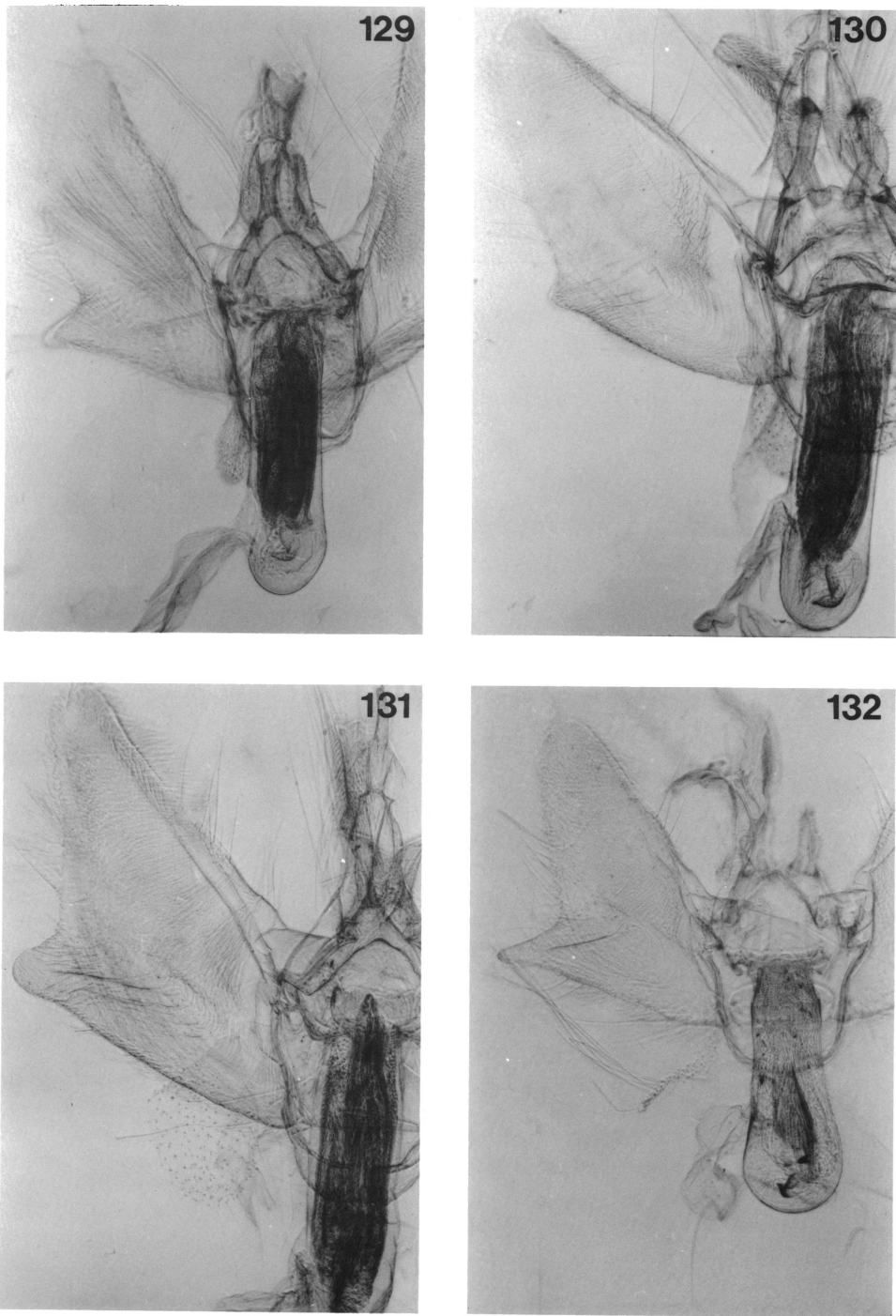
Figures 28–30, 68, 94, 95, 128, 173, 174

Eupithecia sibylla Butler, 1882: 405.

Tephroclystia praelongata Warren, 1900: 167. New combination with *Eupithecia*; NEW SYNONYMY.

Eupithecia davis Vojnits, 1985: 405, figs. 1–3, 13, pl. 1, figs. 1, 2. NEW SYNONYMY.

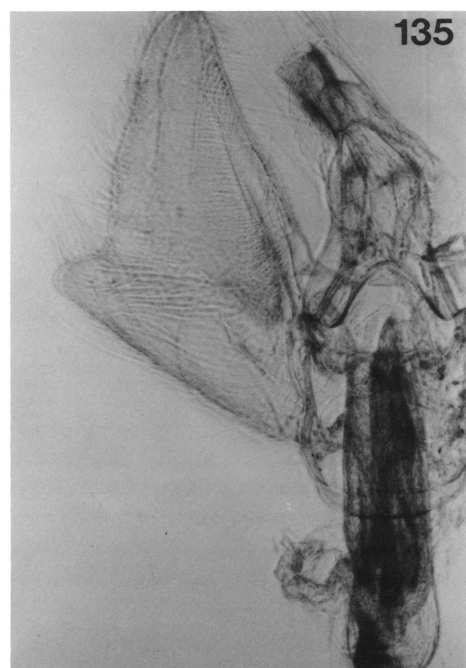
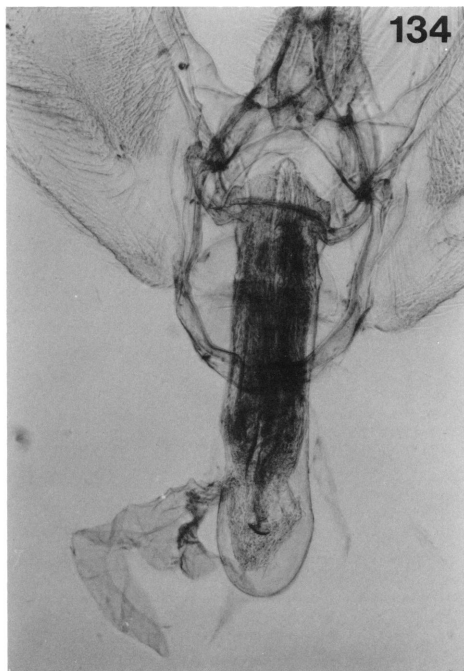
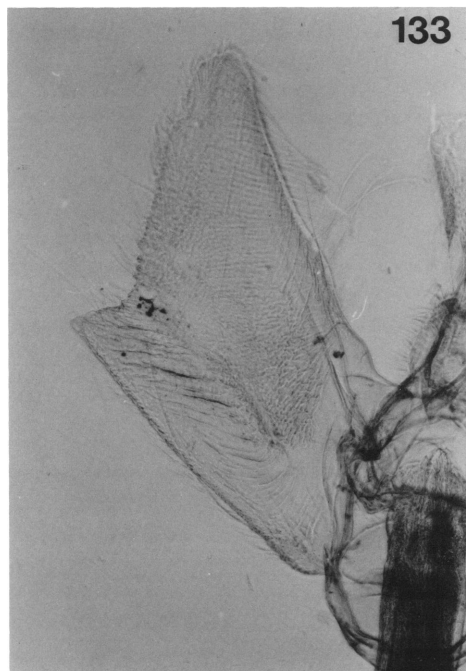
DIAGNOSIS: The gray forewings of this species are relatively broad, with an attenuate



Figs. 129–132. Male genitalia of *Eupithecia*. **129.** *E. juncalensis*, new species, holotype. **130.** *E. picada*, new species, holotype. **131.** *E. pucatrihue*, new species, holotype. **132.** *E. tenoensis*, new species, holotype. All specimens in AMNH.

apex. The male antennae are simple and shortly ciliate. The gray palpi extend beyond

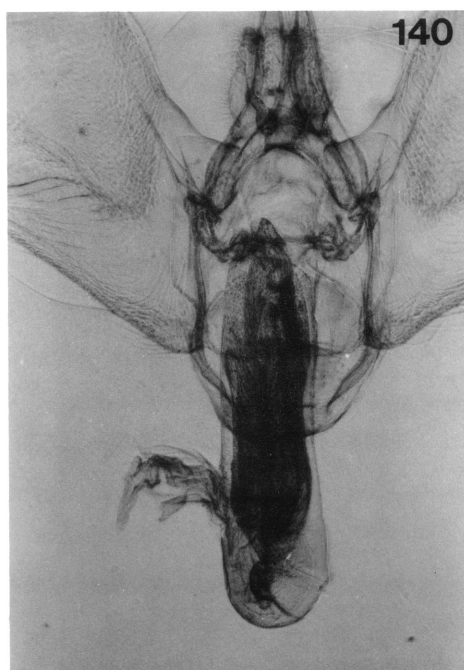
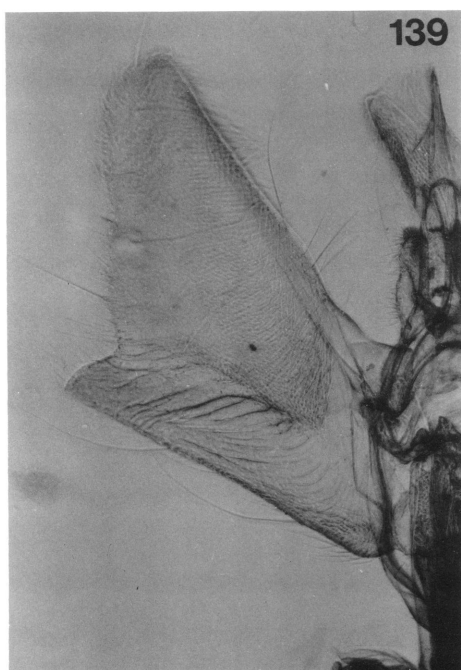
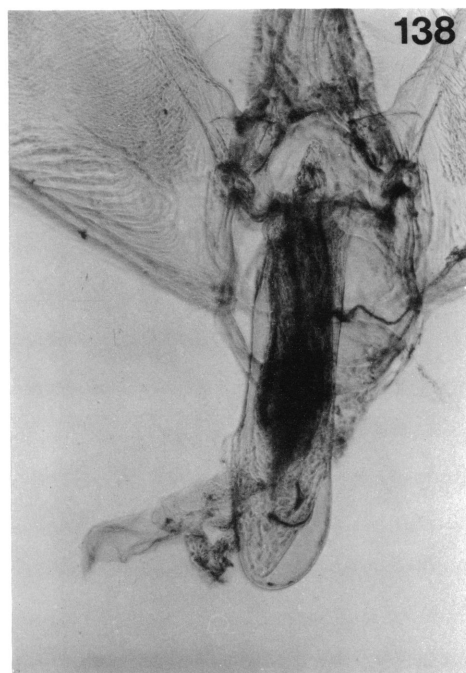
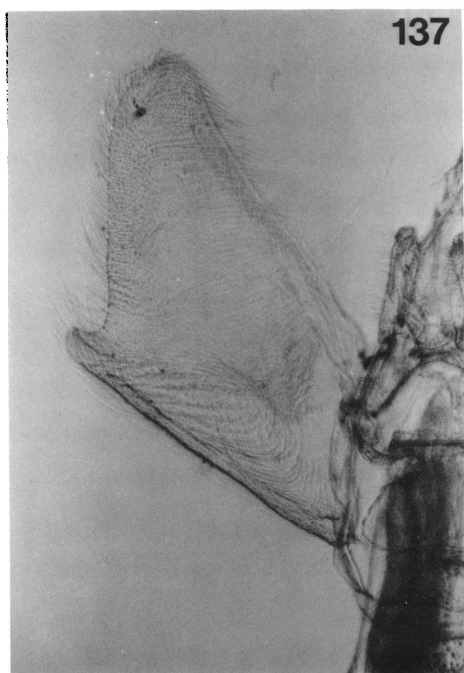
the front of the eyes by a distance equal to the diameter of the eyes (males) to 1.1 to 1.4



Figs. 133–136. Male genitalia of *Eupithecia*. **133, 134.** *E. mallecoensis*, new species, holotype. **133.** Left valve. **134.** Aedeagus and associated structures. **135.** *E. frequens* Butler. **136.** *E. maule*, new species, holotype. All specimens in AMNH.

times (females). The ventral plate is long and slender, with or without short apical arms.

The male genitalia have the sacculus terminating in a slender, sharply pointed projec-



Figs. 137–140. Male genitalia of *Eupithecia rosalia* Butler. **137, 138.** Anticura, Osorno. 137. Left valve. 138. Aedeagus and associated structures. **139, 140.** Rio Blanco, Malleco. 139. Left valve. 140. Aedeagus and associated structures. All specimens in AMNH.

tion, and the vesica has a very large sclerotized piece plus a small basal piece. The female

genitalia have the bursa copulatrix with large, lateral areas of hairlike spines, and a slender,

heavily sclerotized strip between the ductus bursae and the ductus seminalis.

ADULTS: Palpi gray or with mixture of pale gray and brownish gray scales, being concolorous with front; palpi of males extending beyond front of eyes by distance equal to 0.9 to 1.2 times diameter of eyes or 0.6 to 0.7 mm, of females from 1.1 to 1.4 times or 0.6 to 0.9 mm. Eyes of females slightly smaller than those of males. Antennae of males (fig. 68) simple, without lobes, shortly ciliate; of females shortly ciliate.

Upper Surface of Wings (figs. 28–30): Forewings relatively broad, with attenuate apex; pale gray, with darker scales indicating cross lines, and with variable amount of reddish brown scaling opposite end of cell; maculation variably represented, of several incomplete diagonal cross lines more or less paralleling outer margin, with divided t. p. line being the most prominent; discal dot small, slightly raised, grayish black; s. t. line obsolescent; terminal line grayish black, interrupted by veins; fringe concolorous with wing, basal half darker than outer portion. Hind wings pale grayish white, slightly darker distally, and with gray and grayish black scales along anal margin; discal dot absent or weakly represented; maculation obsolescent, some specimens with traces of cross lines; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings pale gray or pale brownish gray, with several slightly darker spots along costa; discal dash dark gray; maculation obsolescent except for weakly represented t. p. line; terminal line and fringe similar to those of upper surface. Hind wings pale grayish white, with grayish brown scales forming outline of extradiscal line; terminal line and fringe similar to those of forewings.

Length of Forewings: Males, 7.0 to 8.5 mm; females, 7.0 to 10.5 mm.

Segment VIII (figs. 94, 95): Ventral plate with triangular base, posterior extension slightly tapering or with parallel sides, margins tending to be irregular, apex varying from merely rounded to having parallel arms 25 percent length of plate; tergite with long, slender, sclerotized, biconcave rod anteriorly, a narrow triangular base, an elongate and slender posterior extension, with tergite at least 1.5 times length of plate.

Male Genitalia (fig. 128): Uncus with two

widely separated, sclerotized, laterally flattened apical points; anellus subtriangular, with narrow, sclerotized, curved posterior arms; valves with sclerotized sacculus extending 50 percent length of outer margin, terminating in slender, sharply pointed projection, and with apex of valve broadly rounded; aedeagus weakly constricted medially; vesica apparently with single, very large, curved, sclerotized piece occupying most of length of aedeagus, lateral margins thickened, surface partially striate, anterior end somewhat irregular, and with small, sclerotized, variably shaped basal piece, often C-shaped in cross section.

Female Genitalia (figs. 173, 174): Ductus bursae weakly tapered, wider anteriorly, about twice as long as wide; bursa copulatrix ovoid when viewed ventrodorsally, laterally with anterior end broadly rounded, posteroventrally angled dorsally to ductus bursae; bursa membranous, with large, lateral, symmetrical areas of hairlike spines directed medioventrally, and with slender, heavily sclerotized strip extending from near ductus bursae for about 40 percent length of bursa, strip with more or less even, sharply defined borders, and with little or no lateral striations; ductus seminalis arising from ventral surface of bursa anterolaterally from end of strip on left side, with relatively wide base, extending posteriorly or posterolaterally to left.

TYPES: Holotype, male, of *sibylla* in the BMNH; examined (fig. 28). The right forewing is in a capsule on the pin. A head has been glued on backwards; it is probable that this is the original head, as the palpi and antenna (one of the latter glued on the occipital foramen) appear to belong to this species. In addition, the abdomen is missing. The condition of the left forewing is excellent, which makes a positive identification possible, without any question.

Holotype, female, of *praelongata* in the BMNH; examined (fig. 29). The type is poorly mounted; the upper surface of the forewings are rubbed, and the head and thorax have some mold spores. The genitalia are mounted on slide FHR No. 19,704; the identification of the type is made from these structures.

Holotype, male, of *davisi* in the USNM; not examined.

TYPE LOCALITIES: For *sibylla*, Valparaiso,

Chile; for *praelongata*, "Chili"; for *davisi*, Río Teno, 800 m, ca. 40 km E Curico, Maule Province, Chile.

DISTRIBUTION: The regions of Antofagasta (Antofagasta Province), Atacama (Chanaral and Huasco provinces), Coquimbo (El Qui, Limari, and Choapa provinces), Valparaíso (Petorca and Los Andes provinces), Santiago (Santiago Province), O'Higgins (Cachapoal Province), Maule (Curicó, Talca, and Linares provinces), and Biobío (Ñuble Province). This covers Chile from about 24°, south to about 37°, and includes the Northern Desert, Northern Coast, Intermediate Desert, Coquimban Desert, Central Andean Cordillera, Central Valley, and the Northern Valdivian Forest biotic provinces. The species has been captured at elevations from 600 to 1900 m, according to those labels that have this information.

REMARKS: Eighty-nine specimens (30 males, 59 females), four male slide mounts of antennae and legs, and 24 genitalic dissections (10 males, 14 females) have been studied, including the holotypes of *sibylla* and *praelongata*. This is one of the more commonly captured *Eupithecia*; this may be correlated with its extensive distribution.

The apical region of the ventral plate is somewhat variable; two examples are shown (figs. 94, 95).

***Eupithecia juncalensis*, new species**

Figures 31, 96, 129, 175, 176

DIAGNOSIS: The gray and grayish brown forewings of this species are broadly triangular. The pale brown palpi of the female are apparently longer than the diameter of the eyes. The ventral plate has a prominently recessed anteromedian portion, with the posterior part having parallel sides and long arms. The male genitalia have the sacculus with a large projection, and the vesica has several sclerotized pieces plus a slender, curved basal piece. The female genitalia have the bursa copulatrix with the dorsal surface having small groups of well-spaced spines in the coarsely punctate surface, and the area between the ductus bursae and ductus seminalis is weakly sclerotized, striate, and poorly defined.

ADULTS: Palpi pale brown, paler at apex; palpi of female apparently longer than di-

ameter of eyes or 0.7 mm (head of female crushed; head of male missing). Antennae of female thickly, shortly ciliate.

Upper Surface of Wings (fig. 31): Forewings broad, with diagonal outer margin; pale gray, with numerous gray and brown scales, producing a somewhat mottled appearance; maculation weakly indicated, with dark brown areas and scale lines along costa and across wing, with brown discal spot, median area slightly paler than remainder of wing, t. p. line divided anteriorly, becoming obsolescent posteriorly, s. t. line white, slender, present in anterior part of wing; terminal line dark brown, interrupted by veins; fringe concolorous with wing, basal half darker than outer portion. Hind wings grayish, with dark scaling along anal margin; discal dot small, not prominent; maculation obsolescent, some traces of cross lines along anal margin; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings pale grayish brown, becoming browner distally; discal dash dark gray extending to costa; maculation obsolescent except for trace of t. p. line in anterior portion of wing; terminal line and fringe similar to those of upper surface. Hind wings pale grayish white with pale grayish brown scaling; small discal dot and trace of faint extradiscal line present; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, male, 9.0 mm; paratype, female, 9.5 mm.

Segment VIII (fig. 96): Ventral plate with wide base, anterolateral areas quadrate, each 20 percent width of base, medially recessed, slightly concave, posteriorly constricted, with caudal 60 percent having parallel sides, arms long, slender, 40 percent length of plate, apically both having outer margins rounded inwardly; tergite with long, slender, sclerotized biconcave rod anteriorly, a short, broadly triangular base, an elongate and slender posterior extension, with tergite 1.3 times length of plate.

Male Genitalia (fig. 129): Uncus with two widely separated, sclerotized, laterally flattened apical points; anellus subtriangular, with narrow, sclerotized posterior areas; valves with broadly sclerotized sacculus, outer margin weakly S-shaped, less than half length of outer margin of valve, terminating

in large, broad, apically rounded projection, and with apex of valve broadly rounded; aedeagus weakly constricted medially; vesica apparently with several sclerotized pieces, one on left side ventrally with concave, broad posterior end, tapering to anterior point, a broader dorsal piece with thickened lateral margins, plus median area with convoluted membrane, and a slender, sharply curved, weakly sclerotized basal piece.

Female Genitalia (figs. 175, 176): Ductus bursae weakly tapered, slightly longer than wide; bursa copulatrix ovoid, with postero-ventral portion concave, left side and dorsal surface coarsely punctate, dorsal surface medially with small groups of well spaced spines, the latter becoming single anteriorly, and with wide, lightly sclerotized concave area extending from near ductus bursae for about 33 percent length of bursa, this area with numerous longitudinal striations across ventral surface and around right side, not having any definite boundaries; ductus seminalis arising from ventral surface just posteriad of middle of bursa, with round or elliptical base, extending ventrally or to right, then becoming C-shaped and terminating anteriorly.

TYPES: Holotype, male, and paratype, female, Juncal, Andes, Aconcagua Province, Chile, November 2, 1958 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,445.

Both type specimens are in the collection of the AMNH.

DISTRIBUTION: The Region of Valparaiso (Aconcagua Province). This is in the Central Valley Biotic Province.

TIME OF FLIGHT: November.

REMARKS: Two specimens (1 male, 1 female) and two genitalic dissections have been studied.

ETYMOLOGY: The specific name is an adjective derived from the type locality.

***Eupithecia picada*, new species**

Figures 32, 69, 97, 130, 177, 178

DIAGNOSIS: This large, variegated brown species has broad forewings. The male antennae have two pairs of short, ventral, setose projections, the basal pair being slightly wider than the distal one, plus a lateral, setose, circular one. The pale brown palpi are very

long and slender, extending beyond the front margin of the eyes by a distance equal to 1.5 times the diameter of the eyes (males) to 2.0 to 2.3 times (females). The ventral plate is long and slender, with elongate arms. The male genitalia have the sacculus with a moderate, triangular projection, and the vesica has a broad, curved sclerotized piece and a basal piece in the form of an inverted T. The female genitalia have the bursa copulatrix with a broad, lightly sclerotized concave band between the ductus bursae and the ductus seminalis.

ADULTS: Palpi pale to medium brown, very long and slender; palpi extending beyond front margin of eyes by distance equal to 1.5 times diameter of eyes or 1.1 mm (males), and from 2.0 to 2.3 times or 1.1 to 1.3 mm (females). Eyes of females smaller than those of males. Antennae of males (fig. 69) with segments having two pairs of short, ventral, setose projections, the basal pair slightly wider than distal pair, plus lateral, circular, setose area; of females shortly ciliate.

Upper Surface of Wings (fig. 32): Forewings broad, with rounded outer margin; variegated with pale gray, pale yellowish brown, and dark brown scales; t. a. line indicated on costa by divided, pale gray, diagonal line, becoming obsolescent when crossing wing; discal spot raised, small, grayish black; t. p. line divided, sharply angled outwardly after crossing costa, then subparallel to outer margin, and having dark basal border; s. t. line white, slender, interrupted; terminal line brownish black, interrupted by veins; fringe narrowly white at base, then dark, with outer portion paler in color, variably darkened opposite vein endings. Hind wings grayish white, with grayish brown scaling distally, dark brown scaling along anal margin; discal dot small, gray, round; maculation obsolescent, some specimens with partial extradiscal line; terminal line grayish black; fringe concolorous with wing, narrowly darkened opposite veins.

Under Surface of Wings: Forewings pale grayish brown or gray, with darker scaling indicating discal dot plus inner and outer margins of t. p. line; vein endings pale gray, often with faint yellowish tinge; terminal line grayish black, interrupted by veins; fringe concolorous with wings, darkened at vein

endings. Hind wings slightly paler than forewings, with darker scaling indicating partial t. a. line, discal dot, and margins of extradiscal line outlined by venular dots; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, male, 10.5 mm; paratypes, females, 9.0 to 11.0 mm.

Segment VIII (fig. 97): Ventral plate elongate, slender, with large base, arms narrow, weakly convex, 33 percent length of plate; tergite with long, slender, biconcave rod anteriorly, an elongate triangular base, a long and slender posterior extension widening distally, with tergite 1.5 times length of plate.

Male Genitalia (fig. 130): Uncus with two widely separated, sclerotized, laterally flattened apical points; anellus with posterolateral margins convex, with narrow, sclerotized posterior arms enlarged at ends; valves with broadly sclerotized sacculus, outer margin curved at base, then very slightly convex, being less than half length of valve, terminating in moderate, triangular projection, and with apex of valve broadly rounded; aedeagus with sides almost parallel; vesica apparently with single, broad sclerotized piece half length and 67 percent width of aedeagus, posterior end truncate, concave, lateral margins appearing thickened, rounded anteriorly, with slender projection toward left side, median area with convoluted membrane, and with inverted T-shaped basal piece.

Female Genitalia (figs. 177, 178): Ductus bursae weakly tapered, with length about equal to width; bursa copulatrix ovoid, membranous, its surface minutely spinulate, especially posteriorly, having broad, lightly sclerotized concave band extending from ductus bursae for about 33 percent length of bursa, posterior end broad, raised medially, with rather poorly defined strip slightly increasing in width anteriorly, its surface with a few, widely spaced longitudinal striations, the latter extending into membranous areas on both sides of band; ductus seminalis arising from ventral surface of bursa at anterior end of sclerotized area on left side from slight transverse swelling, extending posteriorly and then angled posterodorsally.

TYPES: Holotype, male, La Picada, 600 m, N of Petrohue, Llanquihue Province, Chile, January 13–22, 1980 (L. E. Peña). Paratypes, all from Chile and collected by L. E. Peña:

30 km NE of Villarica, Cautín Province, January, 1965, five females; “Shangri la,” Las Trancas, E of Recinto, Chillan area, Nuble Province, January 19–22, 1979, one female; Enco, Refugio Volcán Schoshuenco, 1100 m, Valdivia, February 20–23, 1978, one female; Enco, E of Lago Riñihue, Valdivia Province, February 20–23, 1978, one female; Lago Toro, 700 m, near Puyhue, Osorno Province, February 7–8, 1978, one female; Cordillera de Piuchue, Chiloé Province, March, 1981, one female. The genitalia of the holotype are mounted on slide FHR 19,415A, and an antenna and set of legs are on FHR 19,415B.

The holotype and paratypes are in the collection of the AMNH.

DISTRIBUTION: The regions of Biobio (Ñuble Province), Araucania (Cautín Province), and Los Lagos (Valdivia, Osorno, Llanquihue, and Chiloé provinces). The above are in the Northern Valdivian Forest and the Valdivian Forest biotic provinces.

TIME OF FLIGHT: December, January, February, and March.

REMARKS: Eleven specimens (1 male, 10 females), two slide mounts (1 male, 1 female) of antennae and legs, and four genitalic dissections (1 male, 3 females) have been studied.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

Eupithecia pucatrihue, new species

Figures 33, 70, 98, 131, 179, 180

DIAGNOSIS: This brown species has broadly triangular forewings. The male antennae have a basal pair of rounded, flattened projections wider than the segment, and the distal pair is similar but smaller. The dark brown or blackish brown palpi are narrowly white ventrally, and extend beyond the front margin of the eyes by a distance equal to 1.1 times the diameter of the eyes (males) to 1.1 to 1.5 times (females). The ventral plate is long and slender, has the lateral margins more heavily sclerotized than the central area, and has elongate, very narrow arms. The male genitalia have the sacculus with a broad, apically rounded projection, and the vesica has several sclerotized pieces that occupy almost the entire length of the aedeagus, plus a C-shaped basal piece. The female genitalia have the

bursa copulatrix with a prominent, finely striate sclerotized strip that increases in width between the ductus bursae and the ductus seminalis.

ADULTS: Palpi dark brown to blackish brown, very narrowly white on ventral surface; palpi extending beyond front margin of eyes by distance equal to 1.1 times diameter of eyes or 0.75 mm (males) and from 1.1 to 1.5 times or 0.60 to 0.75 mm (females). Eyes of females smaller than those of males. Antennae of males (fig. 70) with basal pair of projections lamellate, rounded, flat, with pair wider than segment, distal pair of projections similar but smaller, and both pairs bearing long setae; of females shortly ciliate.

Upper Surface of Wings (fig. 33): Forewings broadly triangular; dark brown, with some gray and blackish brown scaling; veins partially covered with either pale orange-brown or with short, alternating areas of grayish white and black scales; discal spot small, raised, grayish black; maculation obsolescent except for slender, incomplete gray t. p. line and very narrow, partially represented s. t. line; terminal line dull black, interrupted by veins; fringe concolorous with wing, slightly darkened opposite vein endings. Hind wings paler than forewings, brown, with groups of blackish brown scales along anal margin, with largest area next to base of wing; discal dot small or obsolescent; maculation weakly indicated by dark scaling along anal margin, some specimens with partial extradiscal line; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings grayish brown, slightly paler posteriorly; discal dot grayish black; maculation weakly indicated along costa, absent on wing except for partial t. p. line; terminal line and fringe similar to those of forewings. Hind wings gray, with numerous brown scales, latter weakly indicating some partial cross lines; discal dot small, grayish black; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, male, 10.0 mm; paratypes, females, 9.0 to 10.5 mm.

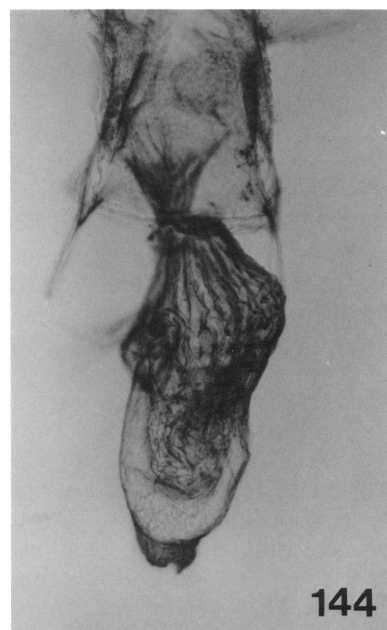
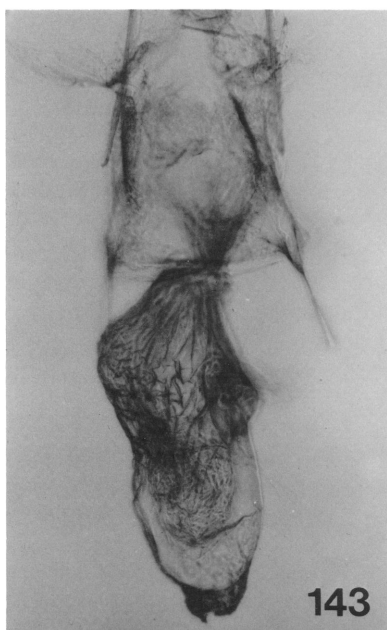
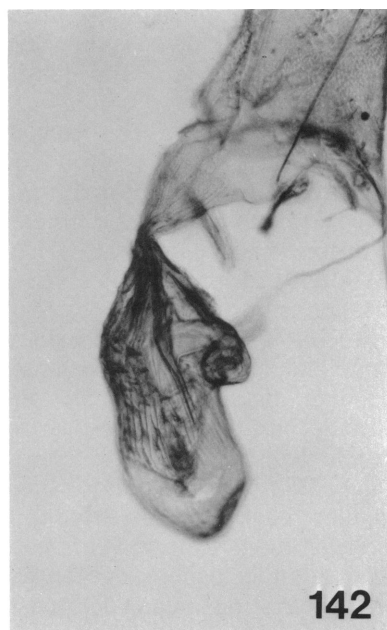
Segment VIII (fig. 98): Ventral plate long and slender, with lateral margins more heavily sclerotized than central area, arms weakly convex, very narrow, 40 percent length of plate, and with anterior margin broadly con-

cave; tergite with long, slender, biconcave rod anteriorly, an elongate triangular base, a long and relatively slender posterior extension, with tergite 1.4 times length of plate.

Male Genitalia (fig. 131): Uncus elongate, with two widely separated, sclerotized, laterally flattened apical points, ventral one broader and more apically rounded than dorsal; anellus with evenly tapered posterolateral margins, with posterior arms broad basally, tapering and recurving apically; valves with broad, slightly striate, weakly sclerotized sacculus, outer margin weakly concave basad of prominent, broad, apically rounded projection, and with apex of valve bluntly pointed; aedeagus with parallel sides; vesica with several sclerotized pieces occupying more than 90 percent length of aedeagus, posteriorly bluntly pointed, anterior end with slender, median projection extending as far as middle of C-shaped basal piece.

Female Genitalia (figs. 179, 180): Ductus bursae weakly tapered, with length about equal to width; bursa copulatrix ovoid, membranous, its surface minutely spinulate, having prominent, sclerotized, concave strip extending from ductus bursae for about 33 percent length of bursa, posterior end narrow, sharply raised, with strip evenly increasing in width anteriorly, its surface with numerous fine longitudinal striations, the latter extending into membranous areas on both sides of sclerotized strip; ductus seminalis arising from ventral surface of bursa at anterior end of sclerotized strip on left side from slight transverse swelling, extending posteriorly and then curved to right.

TYPES: Holotype, male, Pucatrihue, coast of Osorno Province, Chile, February 1–10, 1967 (L. E. Peña). Paratypes, all from Chile and collected by L. E. Peña: "Aguas Calientes," 600 m, Puyehue National Park, Osorno Province, February 10–22, 1979, two females; Aguas Calientes, near Puyehue, February 6–7, 1978, one female; Aguas Calientes, 400 m, Puyehue, December 12–27, 1981, one female; Río Colorado, Cajon del Maipo, 1000 m, Santiago Province, October 30, 1981, one female; Cordillera de Las Raices, mountains in Lonquimay area, Malleco Province, December 28–29, 1967, one female; La Selva, NW of Nuevo Imperial, Cautín Province, March 11, 1984, one female. The genitalia of

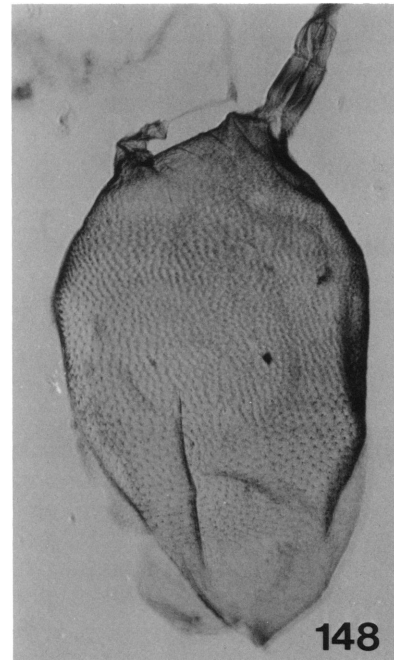
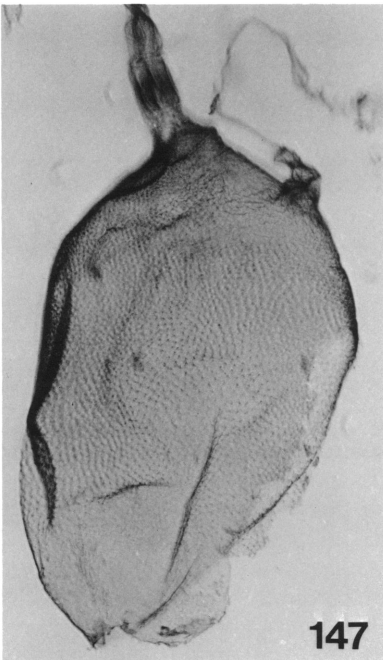
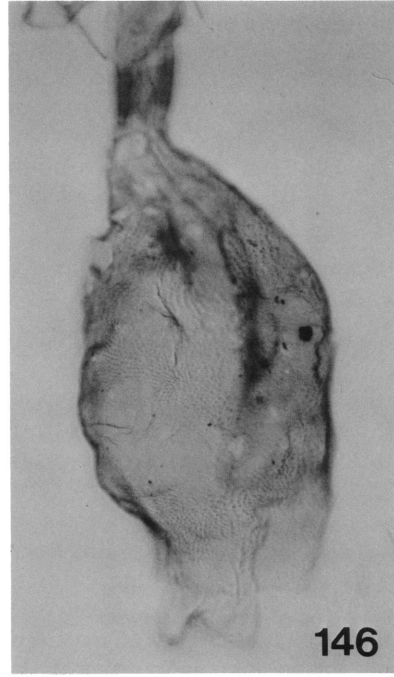
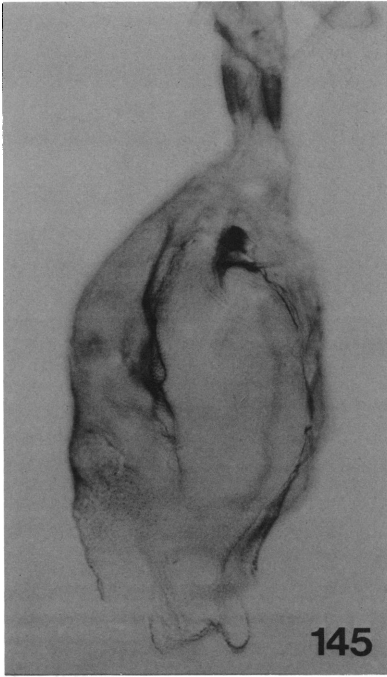


Figs. 141–144. Female genitalia of *Eupithecia*. **141.** *E. osornoensis*, new species, paratype, ventral view. **142.** *E. atacama* (Vojnits), ventral view. **143, 144.** *E. atacamaensis*, new species, paratype. **143.** Ventral view. **144.** Dorsal view. All specimens in AMNH.

the holotype are mounted on slide FHR 19,614.

The holotype and paratypes are in the collection of the AMNH.

DISTRIBUTION: The regions of Santiago (Santiago Province), Araucania (Malleco and Cautín provinces), and Los Lagos (Osorno Province). These correspond to the Central



Figs. 145–148. Female genitalia of *Eupithecia*. **145, 146.** *E. oenone* Butler. 145. Ventral view. 146. Dorsal view. **147, 148.** *E. physocleora* Prout. 147. Ventral view. 148. Dorsal view. All specimens in AMNH.

Valley, the Northern Valdivian Forest, and the Valdivian Forest biotic provinces.

TIME OF FLIGHT: October, December, February, and March.

REMARKS: Eight specimens (1 male, 7 females), one female antenna and set of legs, and eight genitalic dissections (the male antenna is mounted with its genitalia) have been studied.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

Eupithecia mallecoensis, new species

Figures 34, 99, 133, 134, 181, 182

DIAGNOSIS: This brown species has broadly triangular forewings. The grayish brown palpi are narrowly white ventrally, and extend beyond the front margin of the eyes by a distance equal to 1.1 times the diameter of the eyes (males) to 1.4 to 1.6 times (females). The ventral plate is long and slender, swollen apically, with short arms. The male genitalia have the sacculus with a broad, triangular, pointed projection, and the vesica has at least one broad, long, sclerotized piece plus an inverted T-shaped basal piece. The female genitalia have the bursa copulatrix with a very broad, well-defined, sclerotized band between the ductus bursae and the ductus seminalis.

ADULTS: Palpi grayish brown, very narrowly white on ventral surface; palpi extending beyond front margin of eyes by distance equal to 1.1 times diameter of eyes or 0.75 mm (males) and from 1.4 to 1.6 times or 0.75 to 0.90 mm (females). Eyes of females smaller than those of males. Antennae of males missing; of females shortly ciliate.

Upper Surface of Wings (fig. 34): Forewings broadly triangular; grayish brown to dark brown, with gray scaling, and with pale reddish brown scaling along ends of veins; maculation obsolescent except for small, raised, grayish black discal dot and for divided, pale gray t. p. line; s. t. line white, slender, tending to be only partially present; terminal line grayish brown or grayish black, interrupted by veins; fringe concolorous with wing, darkened opposite vein endings. Hind wings gray, heavily scaled with grayish brown and dark brown scales; discal dot small, gray; extradiscal line obsolescent or partly present; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings pale grayish brown or gray, with darker scaling indicating discal dot plus inner and outer margins of pale t. p. line; terminal line dark

gray, narrowly interrupted by veins; fringe concolorous with wings, darkened at vein endings. Hind wings slightly paler than forewings, with darker scaling indicating partial t. a. line, discal dot, and margins of extradiscal line being outlined by venular dots; terminal line and fringe similar to those of forewings.

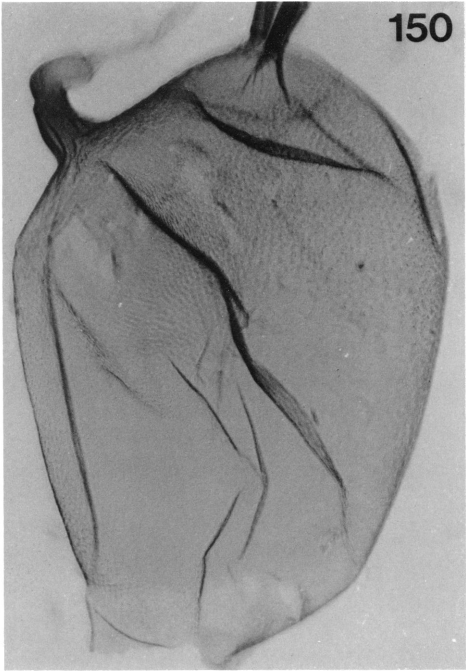
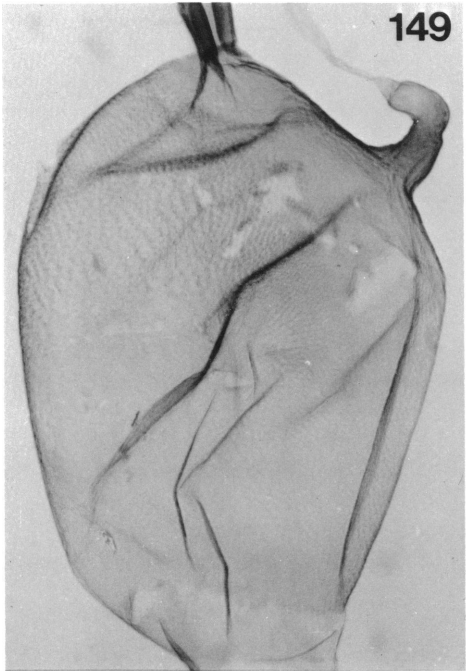
Length of Forewings: Holotype, male, 9.5 mm; paratypes, females, 9.0 to 10.0 mm.

Segment VIII (fig. 99): Ventral plate with wide base, deeply indented medially, posterior extension slender, membranous, apically slightly swollen, arms weakly defined, about 25 percent length of plate; tergite with long, slender, biconcave rod anteriorly, a small triangular base, an elongate, medially constricted posterior extension, with tergite 1.3 times length of plate.

Male Genitalia (figs. 133, 134): Uncus with two widely separated, sclerotized, laterally flattened apical points; anellus with posterolateral margins convex, with narrow sclerotized posterior arms enlarged at ends; valves with broadly sclerotized sacculus, outer margin straight, half length of valve, terminating in broad, triangular, pointed projection, and with apex of valve broadly rounded; aedeagus with sides almost parallel; vesica apparently with at least one, broad, sclerotized piece in area of convoluted, minutely spinose membrane, and with inverted T-shaped basal piece partially dorsad of anterior portion of ornamentation of vesica.

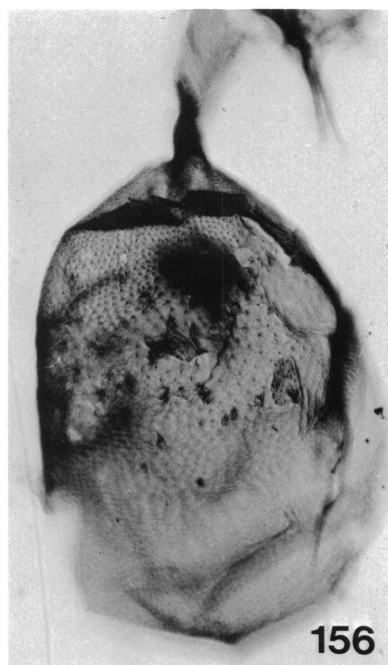
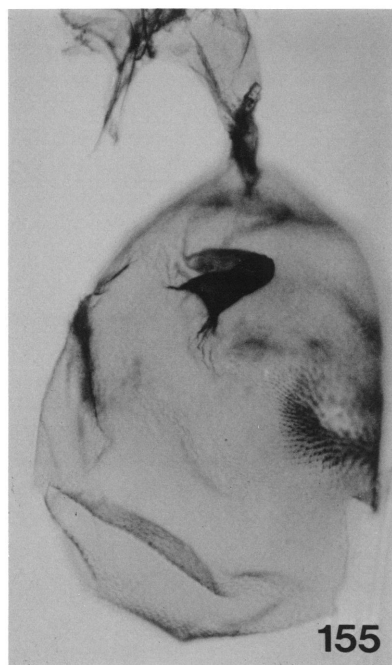
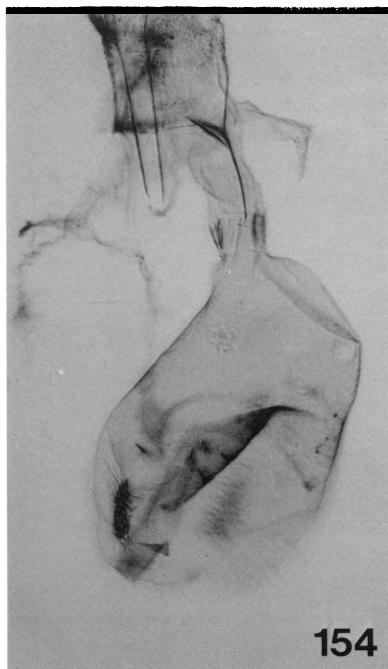
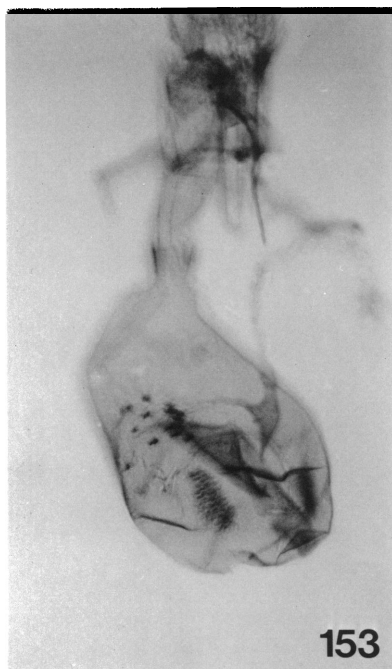
Female Genitalia (figs. 181, 182): Ductus bursae weakly tapered, with length about equal to width; bursa copulatrix ovoid, membranous, with posterior portion sparsely spinulate, having very broad, well-defined, sclerotized concave strip extending from ductus bursae for about 40 percent length of bursa, posterior end broadly rounded, clearly defined, abruptly swelling from area of ductus bursae, margins of strip becoming less sclerotized laterally and hence not clearly defined, the surface with relatively few, widely spaced longitudinal striations posteriorly, becoming more numerous at anterior end, extending into areas on both sides of strip; ductus seminalis arising from ventral surface of bursa at anterior end of sclerotized area on left side from slight transverse swelling, extending posteriorly and then angled to right side.

TYPES: Holotype, male, Río Blanco, Cura-



Figs. 149–152. Female genitalia of *Eupithecia*. **149, 150.** *E. valdivia*, new species, holotype. 149. Ventral view. 150. Dorsal view. **151, 152.** *E. halosydne* Prout, paratype (BMNH). 151. Ventral view. 152. Dorsal view. All specimens in AMNH unless otherwise specified.

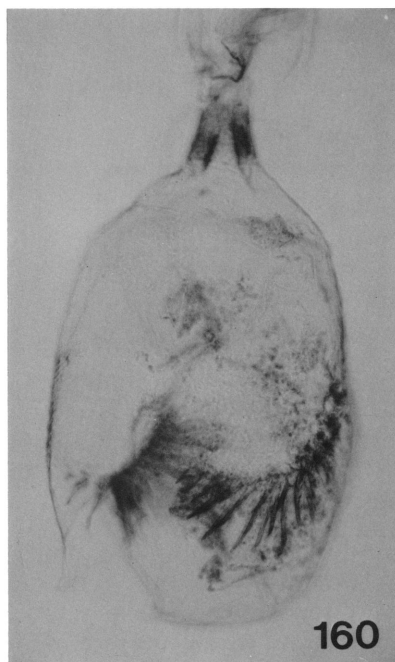
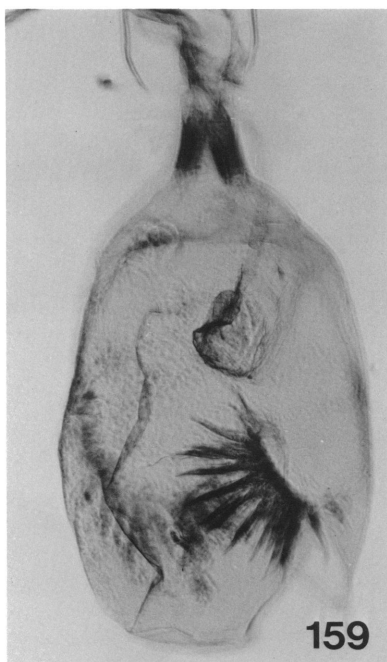
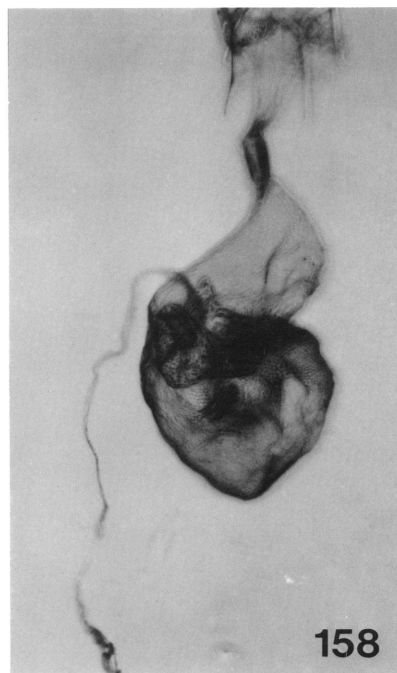
cautin, Andes, Malleco Province, Chile, January 27–February 5, 1959 (L. E. Peña). Para- types, all from Chile and collected by L. E. Peña except for the 1902 specimen: same data



Figs. 153–156. Female genitalia of *Eupithecia*. **153, 154.** *E. trancasae*, new species, paratype. 153. Ventral view. 154. Dorsal view. **155, 156.** *E. cabrasae*, new species, paratype. 155. Ventral view. 156. Dorsal view. All specimens in AMNH.

as holotype, February, 1964, January 20–25, 1974, February 13–20, 1980, four females;

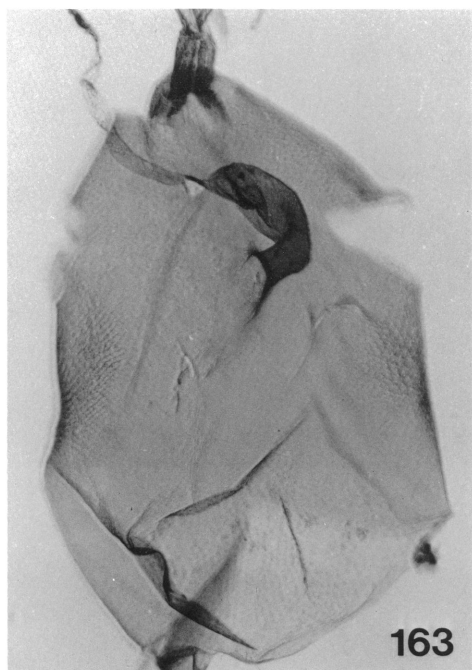
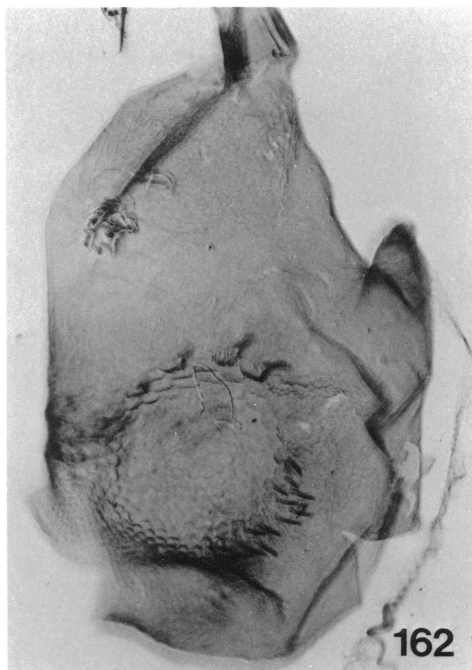
Río Teno, 800 m, Cordillera Curicó, Curicó Province, November 25–29, 1981, one fe-



Figs. 157–160. Female genitalia of *Eupithecia*. **157, 158.** *E. correana*, new species, paratype. **157.** Ventral view. **158.** Dorsal view. **159, 160.** *E. spurcata* (Warren). **159.** Ventral view. **160.** Dorsal view. All specimens in AMNH.

male; Alto de Vilches, Talca Province, December 10–12, 1976, one female; Treguale-

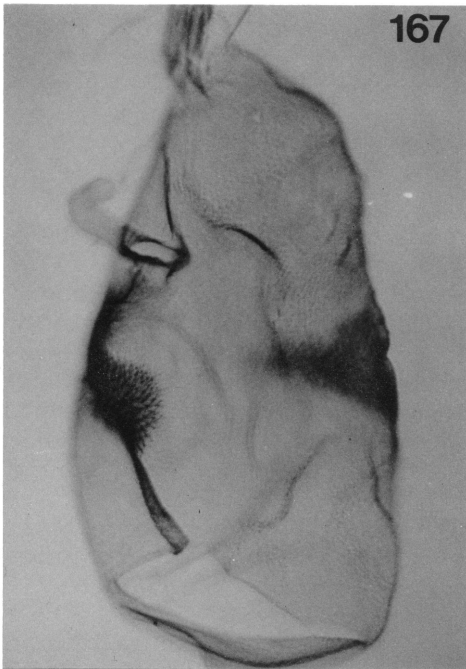
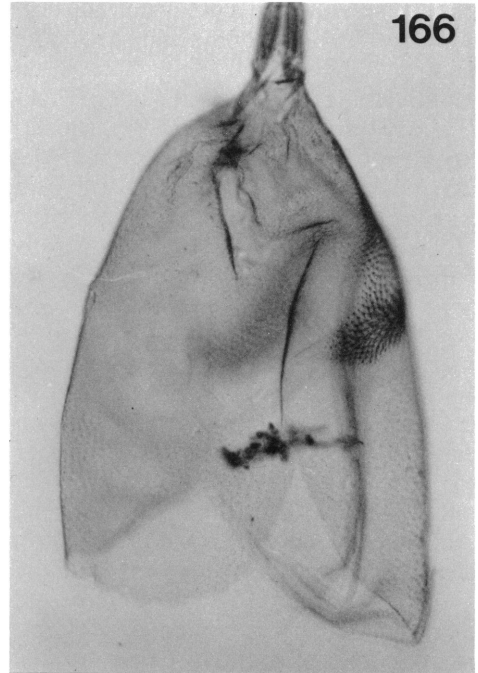
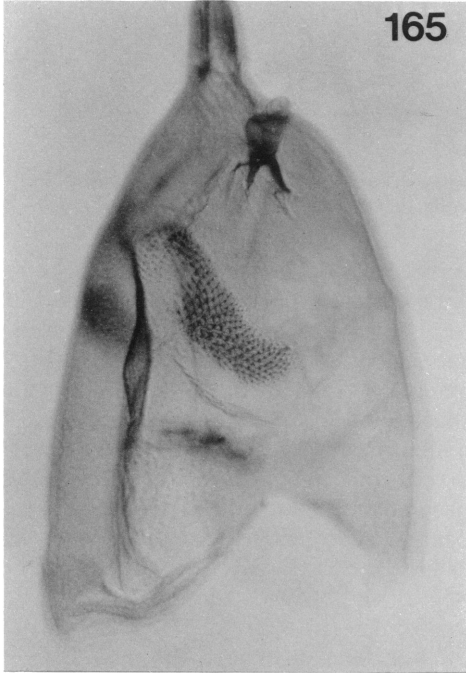
mu, 500 m, W of Cauquenes, Maule Province, December 1–4, 1981, one female; Mulchen,



Figs. 161–164. Female genitalia of *Eupithecia*. **161, 162.** *E. malchoensis*, new species, paratype. 161. Ventral view. 162. Dorsal view. **163, 164.** *E. curacautinae*, new species, paratype. 163. Ventral view. 164. Dorsal view. All specimens in AMNH.

[Bío-Bío Province], January, 1902, one female; Aguas Calientes, 400 m, Puyehue,

Osorno Province, December 12–17, 1981, one female; Rio Carihueico, mountains of



Figs. 165–168. Female genitalia of *Eupithecia*. **165, 166.** *E. yelchoensis*, new species, paratype. 165. Ventral view. 166. Dorsal view. **167, 168.** *E. aysenae*, new species, holotype. 167. Ventral view. 168. Dorsal view. All specimens in AMNH.

Chiloé Island, NW of Castro, Chiloé Province, February 18–25, 1957, one female. The

genitalia of the holotype are mounted on slide FHR 19,421.

The holotype and paratypes are in the collection of the AMNH; one paratype in the BMNH.

DISTRIBUTION: The regions of Maule (Curicó, Talca and Cauquenes provinces), BioBío (the Province of Bío-Bío), Araucanía (Malleco Province), and Los Lagos (Osorno and Chiloé provinces). These localities are in the Central Coastal Cordillera, Northern Valdivian Forest and the Valdivian Forest biotic provinces.

TIME OF FLIGHT: From November into February.

REMARKS: Eleven specimens (1 male, 10 females), two sets of antennae and legs (both females), and seven genitalic dissections (1 male, 6 females) have been studied. In addition, three females plus their genitalia (one from Aconcagua, the others from Malleco), have been studied but are only provisionally placed as this species; in these, the sclerotized concave strip in the bursa copulatrix is slightly more narrowed posteriorly than in the paratypes.

Fletcher (1953: 377) compared a female from Panguipulli (fig. 35) with the worn type of *inexpiata* Walker, and thought the two were "very close in superficial appearance" (see above, under that species). After having determined *inexpiata* by a study of its male genitalia, it became obvious to me that the specimen used by Fletcher was not conspecific, as the wing length, the length of the palpi plus their coloring, and other factors did not agree with the females of *inexpiata* complex. Unfortunately the abdomen of this female is missing and so the genitalia cannot be studied. This specimen is similar in color and maculation to *mallecoensis* and its relatives, and hence is tentatively placed here. I do not consider it conspecific with *mallecoensis*, as the palpi are pale to medium brown, with a prominent grayish white ventral edge, the entire structure being slightly paler than the front; the palpi are also longer, extending beyond the front of the eyes a distance equal to 1.7 times the diameter of the eyes or 1.0 mm. There are differences in maculation also (see the accompanying figures), and the length of the forewings is 10.5 mm. It is probable that the Panguipulli specimen (in the BMNH) represents an undescribed species; without having the genitalia available, I prefer not to describe it as new.

ETYMOLOGY: The specific name is an adjective derived from the type locality.

Eupithecia rosalia Butler

Figures 36, 71, 101–104, 137–140

Eupithecia rosalia Butler, 1882: 405.

Propithecia kristenseni Vojnits, 1985: 408, figs. 4–6, 14, 17, pl. 1, figs. 3–6. New combination with *Eupithecia*; NEW SYNONYMY.

DIAGNOSIS: This species has broad, brown forewings. The male antennae have an elongate, slender basal pair of projections that extend more than twice the diameter of the shaft, plus a small, median, posteriorly directed process arising between bases of basal projections, and with smaller distal pair of projections, also wider than shaft, both pairs bearing several terminal setae twice as long as their projections. The palpi have a mixture of gray and brown scales, and project beyond the front of the eyes a distance 1.1 to 1.4 times the diameter of the eyes (males) or 1.3 times the diameter (females). The ventral plate is elongate, lateral margins more sclerotized than median area, and with terminal arms variable in length. The male genitalia have the sacculus with a large, broad projection, and the vesica has several sclerotized pieces plus a curved basal piece.

ADULTS: Palpi with mixture of gray and brown scales, having white scaling basally on ventral surface; palpi of males extending beyond front of eyes to distance 1.1 to 1.4 times diameter of eyes or 0.75 to 0.90 mm; of females by 1.3 times or 0.7 mm. Antennae of males (fig. 71) with elongate, slender basal pair of projections extending more than twice diameter of antennal shaft, plus a small, median, posteriorly directed process arising between bases of basal projections, and with smaller, slender, distal pair of projections, also wider than shaft, both pairs bearing several terminal setae twice as long as their projections; of females shortly ciliate.

Upper Surface of Wings (fig. 36): Forewings broad, with apex slightly pointed; brown, with gray and blackish brown scales, and having faintly orange-brown scales along cubital vein and on veins in outer portion of wing; maculation obscure, with rather nebulous t. p. line indicated, having some dark scaling basally; discal dot small, of raised grayish black scales; terminal line grayish white, thin, out-

wardly angled in cells; terminal line dull black, interrupted by veins; fringe narrowly pale adjacent to wing, basal half darker than outer portion, somewhat darkened opposite veins. Hind wings grayish white, with irregular brown scaling distally and along anal margin, in some specimens forming incomplete cross lines; discal dot obsolescent or small, gray; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewing brownish gray, with darker scaling in groups along costa, forming small discal dot, and on veins in anterior portion of wing basad of obsolescent t. p. line; terminal line slender, dark gray, narrowly interrupted by pale veins; fringe concolorous with wing, slightly darkened opposite vein endings. Hind wings grayish white, with scattered brown scales; discal dot small, prominent; maculation obsolescent, extradiscal line indicated in some specimens by dark venular spots along inner margin; terminal line narrower than on forewings; fringe similar to that of forewings.

Length of Forewings: Males, 8.5 to 10.0 mm; females, 9.0 mm.

Segment VIII (figs. 101–104): Ventral plate elongate, slender, lateral margins slightly more sclerotized than central area, arms very narrow, varying in length from 33 to 40 percent length of plate; tergite with long, slender, biconcave rod anteriorly, a narrow, elongate triangular base, a long and slender posterior extension, with tergite 1.5 times length of plate.

Male Genitalia (figs. 137–140): Uncus with two widely separated, sclerotized, laterally flattened apical points; anellus with posterolateral margins convex, with narrow, sclerotized posterior arms enlarged at ends; valves with broadly sclerotized sacculus, outer margin straight, half length of valve, terminating in large, broad, apically rounded or slightly curved projection, and with apex of valve broadly rounded; aedeagus weakly constricted medially; vesica apparently with several sclerotized pieces in area of convoluted, minutely spinose membrane, and a curved, sclerotized basal piece.

Female Genitalia: Not examined; described and illustrated by Vojnits (1985: 409, fig. 6). According to Vojnits, the bursa copulatrix is elongate and is covered with "minute chitinous spines." The drawing shows

what appears to be a narrow transverse band antieriad of the origin of the ductus seminalis, but this band is not mentioned in the description. In the same drawing, the ductus seminalis appears to be arising from the dorsal surface, perhaps on the right side; this needs to be verified, as all the females placed in my Group C have the origin at the anterior end of the sclerotized strip that has its posterior end at the ductus bursae.

TYPE: The holotype, female, of *rosalia* is in the BMNH, and has been examined (fig. 35); its genitalia are on slide Geom. 1951-296. The specimen is in good condition, although the forewings are slightly rubbed. The genitalic structures are almost entirely destroyed, as only a small part of the bursa copulatrix remains, and it possesses no obvious characters.

The holotype, male, of *kristenseni* is in the USNM; not examined.

TYPE LOCALITIES: For *rosalia*, Valdivia, Chile; for *kristenseni*, Ag[uas] Calientes to 2 km S of the same locality, P[arque] N[acional] Puyehue [incorrectly given as "Fuyehue" by Vojnits], Osorno Province, Chile.

DISTRIBUTION: The regions of Araucania (Malleco Province), and Los Lagos (Valdivia and Osorno provinces); these are in the Northern Valdivian Forest and Valdivian Forest biotic provinces. Vojnits (1985) also lists Coquimbo, Linares, and Nuble provinces; these are all to the north of the material I have studied.

TIME OF FLIGHT: November through February.

REMARKS: Ten specimens (9 males, the holotype female), two slide mounts of male antennae and legs, and nine male genitalic dissections have been studied (plus the holotype, but see above about its condition).

Without having the female genitalia of the holotype available, it becomes more difficult to correctly apply the name *rosalia* to a given population. By using a combination of wing length, palpi length and color, and wing pattern, among other things, I am quite confident of my usage of the name. Once this was established, using AMNH specimens, it then became necessary to place *kristenseni* in the synonymy, as the two names apply to the same species.

The ventral plate and valves are rather variable in this species; see figs. 101–104 and

137–140 for the different configurations of these structures.

Eupithecia tenoensis, new species

Figures 72, 100, 132

DIAGNOSIS: This small species has broad, pointed forewings. The male antennae have an elongate, slender, widely separated pair of basal processes that extend beyond the sides of the segment, while the distal pair of processes are shorter and are connected medially, both pairs of processes with terminal setae as long as their processes. The palpi of the males extend beyond the front of the eyes a distance not exceeding the diameter of the eyes. The ventral plate is long and slender, with very thin arms about half the length of the plate. The male genitalia have the sacculus with a very long, slightly curved process, and the vesica has a single, broad piece less than half the length of the aedeagus, plus a basal piece shaped like an inverted T. (The females have not been examined.)

ADULTS: Palpi descaled, extending beyond front of eyes a distance not exceeding diameter of eyes or at least 0.4 mm. Antennae of males (fig. 72) with basal pair of setae widely separated at their origin, elongate, slender, extending beyond sides of segment, distal pair of processes shorter, connected medially, both pairs of processes with terminal setae as long as their processes.

Upper Surface of Wings: Forewings broad, with pointed apex; almost completely denuded of scales, but apparently pale brownish gray and with discal spot present. Hind wings apparently paler than forewings, with some dark scaling along anal margin.

Under Surface of Wings: Forewings apparently grayish white with brown scaling anteriorly; discal dot only remaining trace of maculation. Hind wings slightly paler, with rows of brown scales indicating incomplete cross lines; discal dot present.

Length of Forewings: Holotype, male, 8.0 mm.

Segment VIII (fig. 100): Ventral plate small, with prominent base, shallowly indented medially, posterior extension slender, with elongate, very thin arms about half length of plate; tergite with tapering base, parallel-sided extension 1.4 times length of plate.

Male Genitalia (fig. 132): Uncus elongate, with two widely separated, sclerotized, laterally flattened apical points; anellus with posterolateral margins only slightly tapered, with narrow, sclerotized posterior arms slightly enlarged at ends; valves with broad, weakly sclerotized sacculus, outer margin weakly S-shaped, half length of valve, terminating in very long, slightly curved projection, and with apex of valve broadly rounded; aedeagus evenly swelling to enlarged anterior end; vesica with single, broad, sclerotized piece less than half length of aedeagus, posterior end truncate, anterior end irregular diagonal, with striate surface, and with inverted T-shaped basal piece.

FEMALE GENITALIA: Unknown.

TYPE: Holotype, male, Río Teno, 800 m, Cordillera Curicó, Curicó Province, Chile, November 25–29, 1981 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,451A, and an antenna and set of legs are on 19,451B.

The holotype is in the collection of the AMNH.

DISTRIBUTION: The Region of Maule (Curicó Province). This is in either the Central Valley or the Northern Valdivian Forest biotic provinces.

TIME OF FLIGHT: November.

REMARKS: One specimen (the holotype), a slide mount of its antenna and legs, plus its genitalia have been studied.

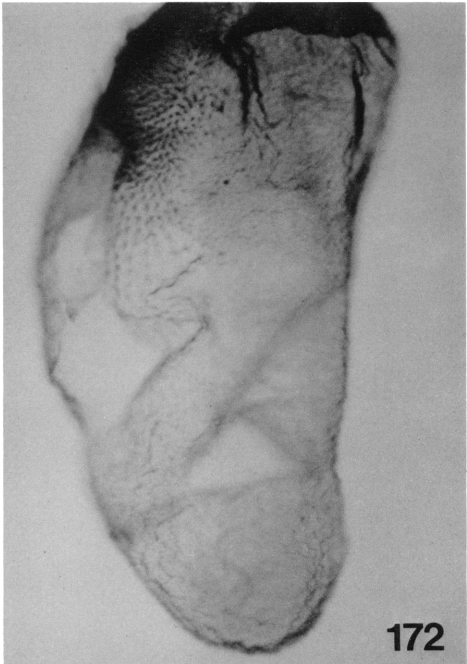
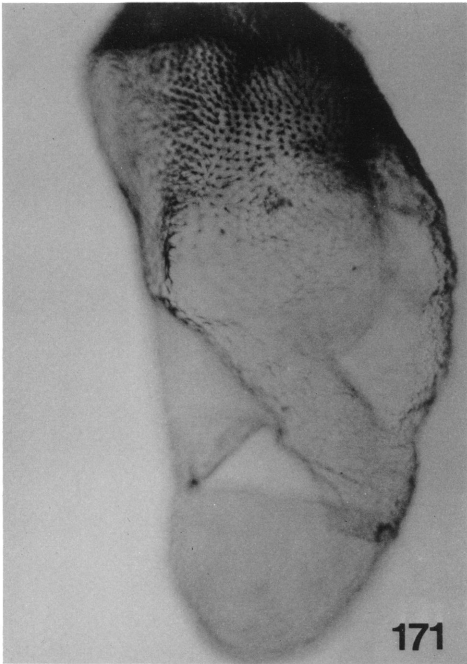
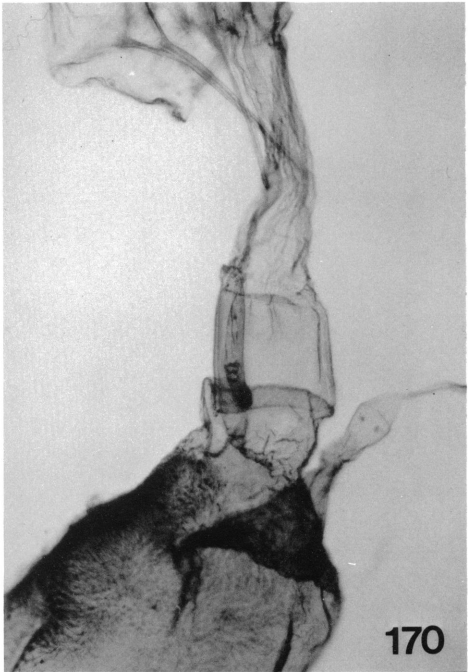
ETYMOLOGY: The specific name is an adjective derived from the name of the type locality.

Eupithecia frequens Butler

Figures 38, 39, 73, 105, 135, 185, 186

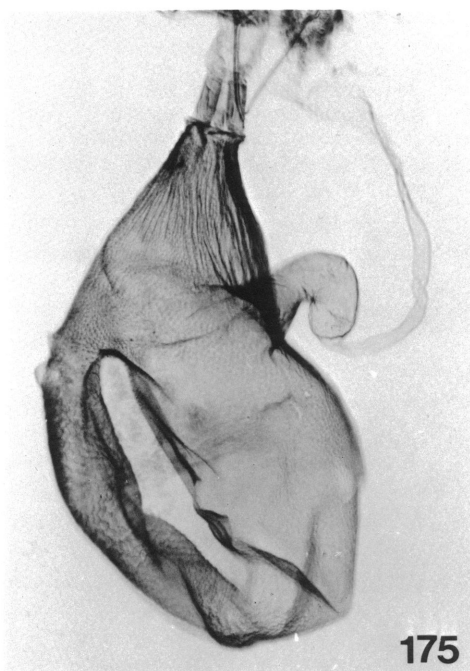
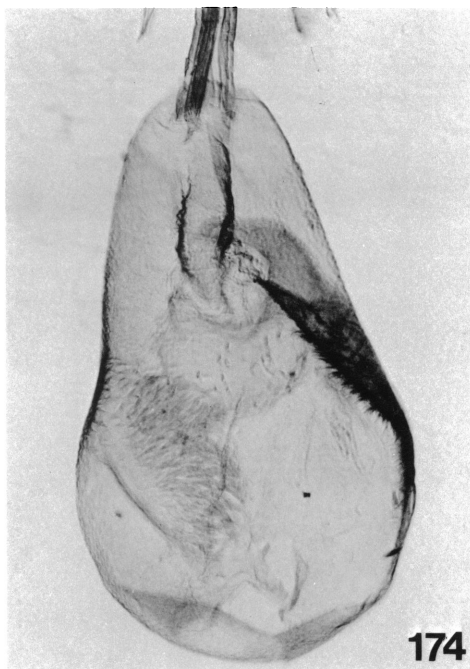
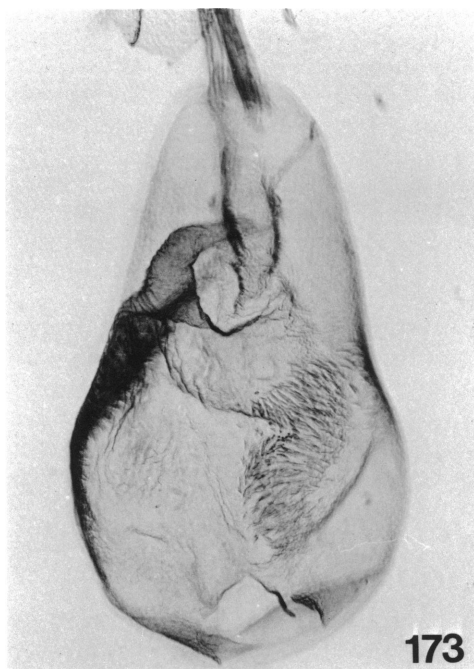
Eupithecia frequens Butler, 1882: 404.

DIAGNOSIS: This dark brown species has broad forewings with a large, black discal spot and relatively well-defined maculation. The male antennae have the basal pair of processes asymmetrical, one side being rounded, the other elongate and slender, and with the distal pair extending at a right angle to the segment. The brown to dark brown palpi are narrowly white ventrally, and extend beyond the front margin of the eyes by a distance equal to 1.1 times the diameter of the eyes (males) to 1.2 to 1.4 times (females). The ventral plate is narrowed medially, with the



Figs. 169–172. Female genitalia of *Eupithecia*. 169. *E. anticura*, new species, holotype; ventral view. 170–172. *E. horismoides*, new species, paratype. 170. Ductus bursae and posterior end of bursa copulatrix, ventral view. 171. Dorsal view. 172. Ventral view. All specimens in AMNH.

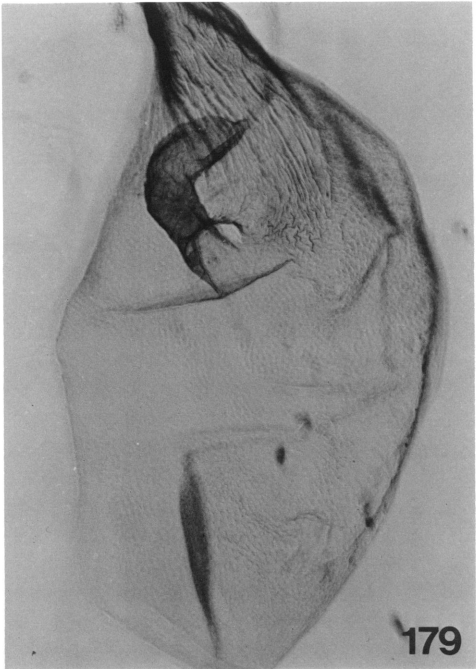
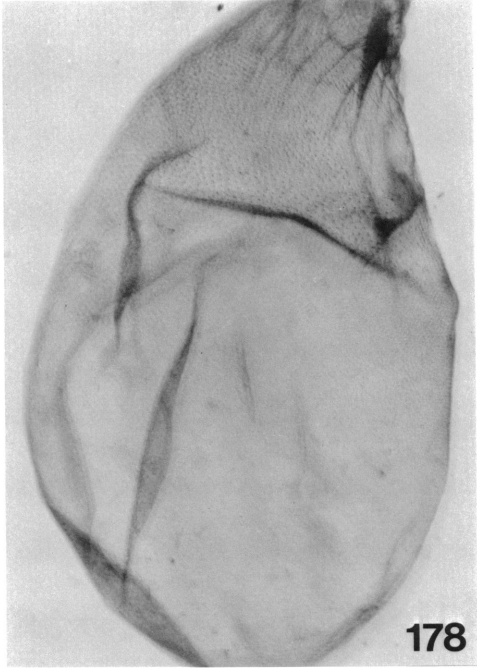
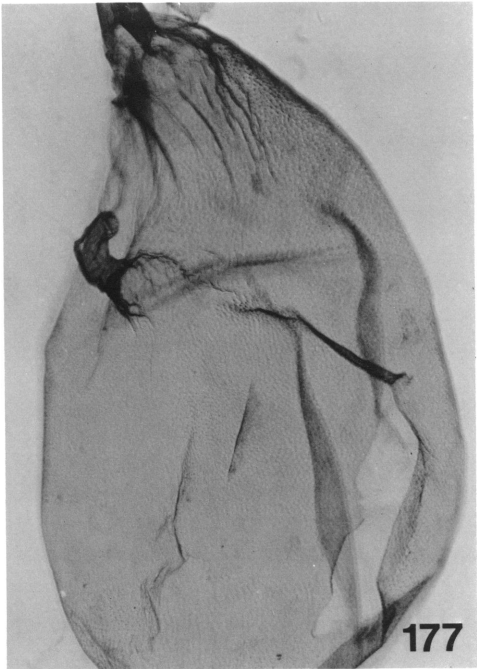
arms being weakly differentiated and convex. The male genitalia have the sacculus with a broad, triangular projection, and the vesica has several elongate sclerotized pieces, plus



Figs. 173–176. Female genitalia of *Eupithecia*. 173, 174. *E. sibylla* Butler. 173. Ventral view. 174. Dorsal view. 175, 176. *E. juncalensis*, new species, paratype. 175. Ventral view; the long slender pale area is a tear in the wall of the bursa copulatrix. 176. Dorsal view. All specimens in AMNH.

a tapered basal piece. The female genitalia have a broad, rather poorly defined band be-

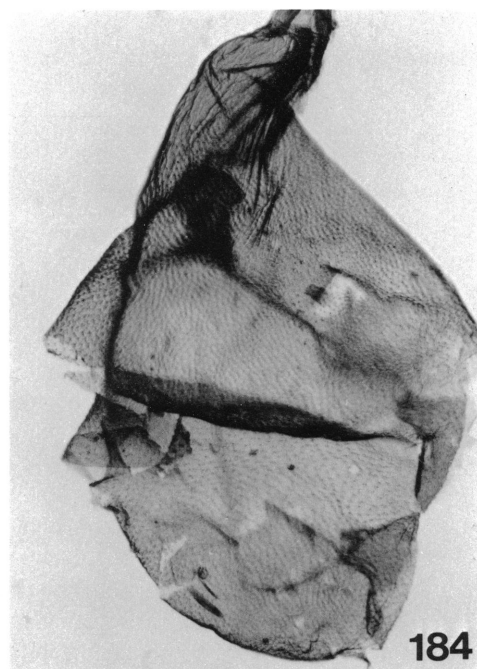
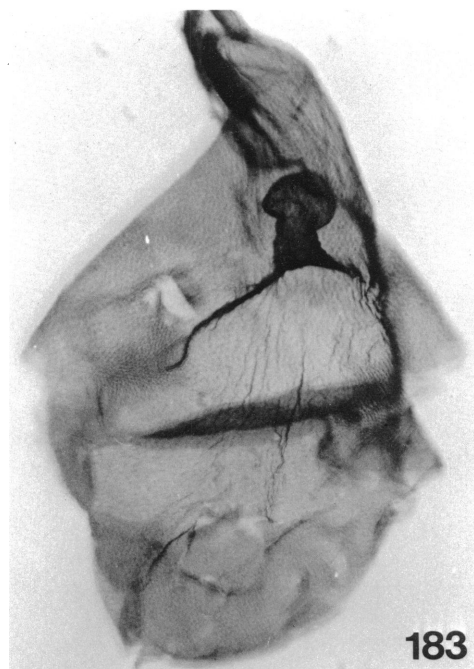
tween the ductus bursae and the ductus seminalis.



Figs. 177–180. Female genitalia of *Eupithecia*. **177, 178.** *E. picada*, new species, paratype. 177. Ventral view. 178. Dorsal view. **179, 180.** *E. pucatrihue*, new species, paratype. 179. Ventral view. 180. Dorsal view. All specimens in AMNH.

ADULTS: Palpi brown (females) or dark brown (males), both sexes narrowly white

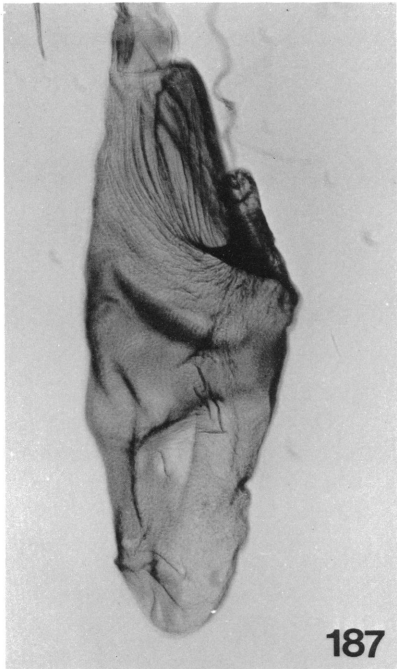
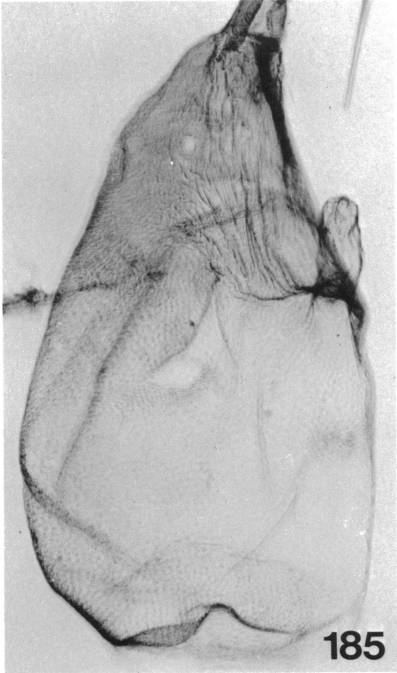
ventrally; palpi extending beyond front margin of eyes by distance equal to 1.1 times



Figs. 181–184. Female genitalia of *Eupithecia*. **181, 182.** *E. mallecoensis*, new species, paratype. 181. Ventral view. 182. Dorsal view. **183, 184.** *E. maule*, new species, paratype. 183. Ventral view. 184. Dorsal view. All specimens in AMNH.

diameter of eyes or 0.75 mm (males) and from 1.2 to 1.4 times or 0.75 to 0.83 mm

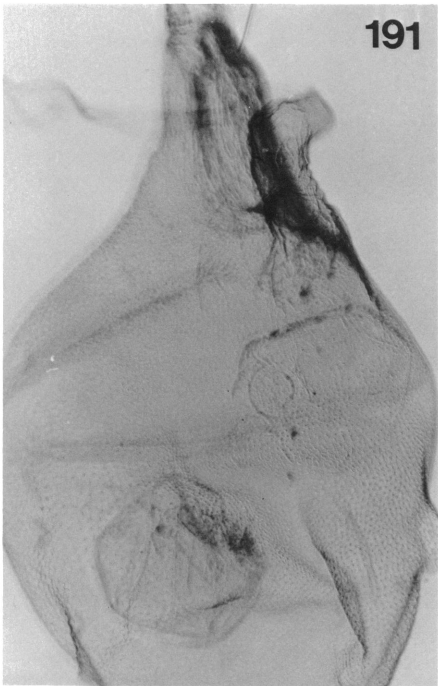
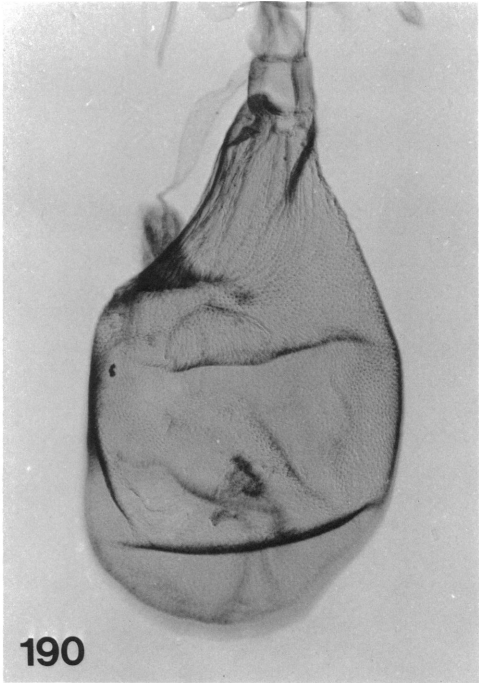
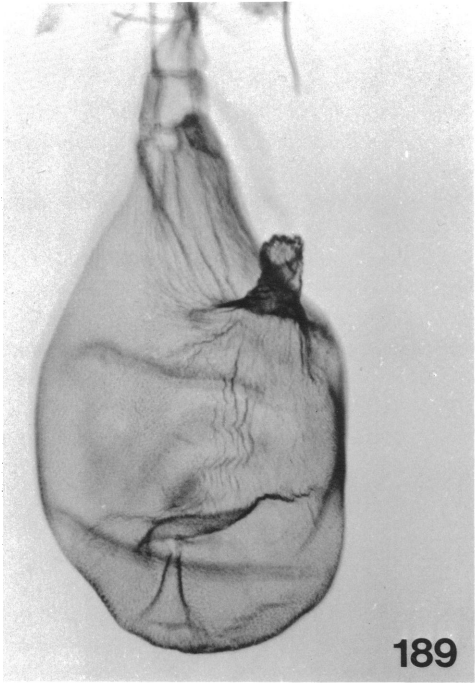
(females). Eyes of females slightly smaller than those of males. Antennae of males (fig. 73)



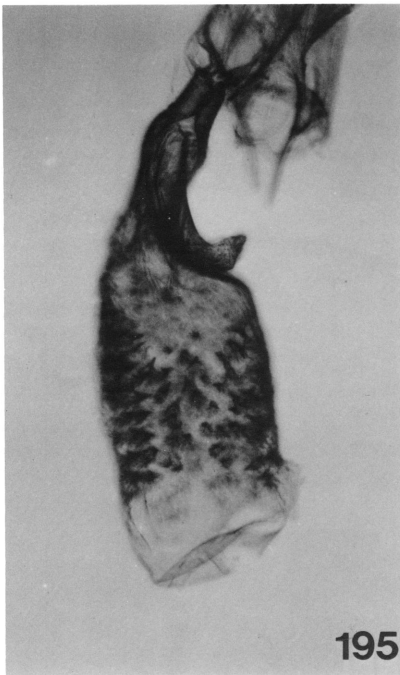
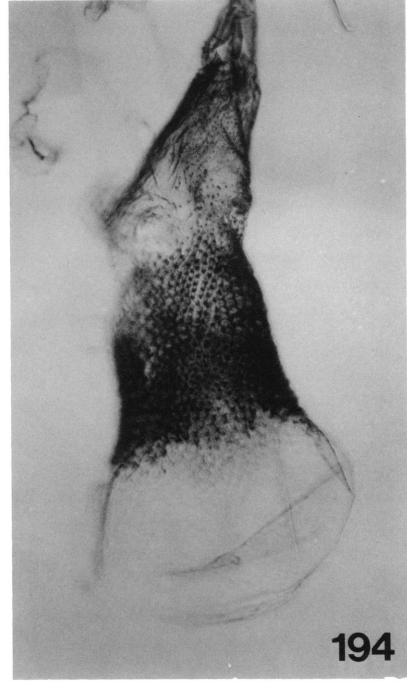
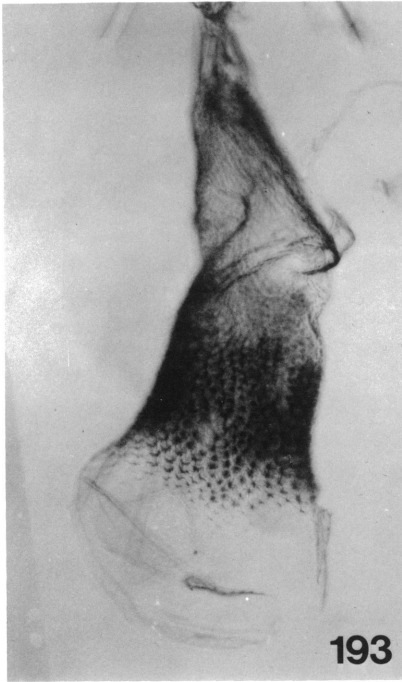
Figs. 185–188. Female genitalia of *Eupithecia*. **185, 186.** *E. frequens* Butler. 185. Ventral view. 186. Dorsal view. **187, 188.** *E. caburgua*, new species, holotype. 187. Ventral view. 188. Dorsal view. All specimens in AMNH.

with asymmetrical basal pair of processes, one side rounded and apparently shagreened,

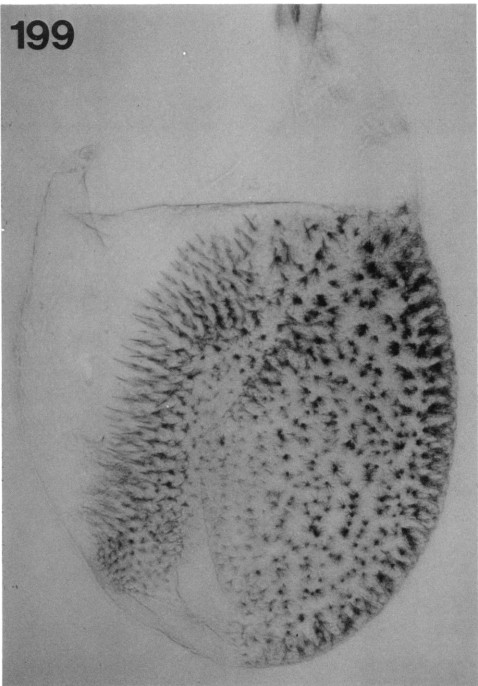
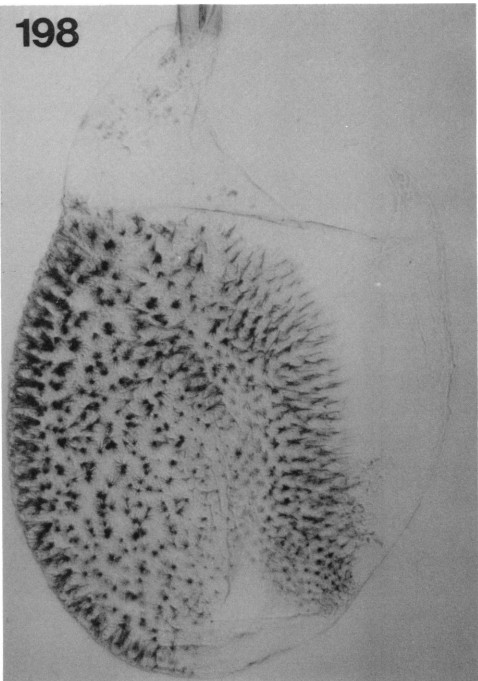
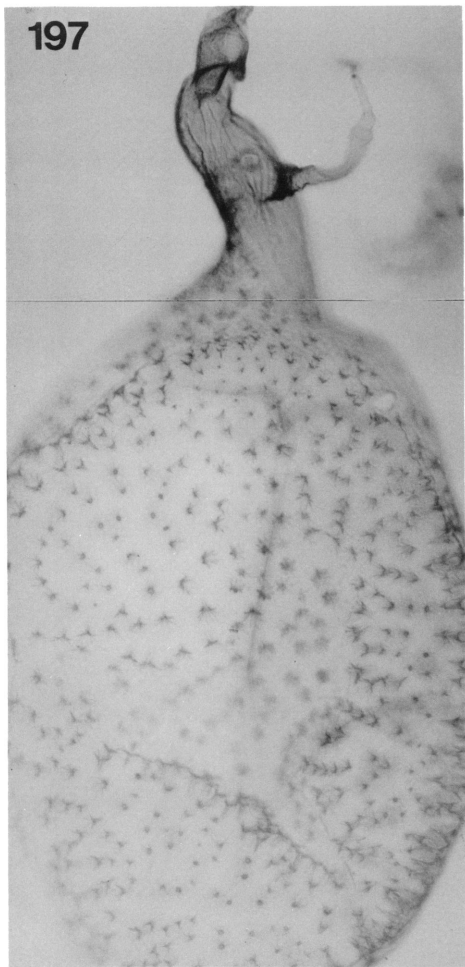
the other elongate and slender, both extending beyond sides of segment, and with distal



Figs. 189–192. Female genitalia of *Eupithecia*. **189, 190.** *E. vallenarensis*, new species, paratype. 189. Ventral view. 190. Dorsal view. **191, 192.** *E. encoensis*, new species, holotype. 191. Ventral view. 192. Dorsal view. All specimens in AMNH.



Figs. 193–196. Female genitalia of *Eupithecia*. **193, 194.** *E. nublalae*, new species, holotype. 193. Ventral view. 194. Dorsal view. **195, 196.** *E. recintoensis*, new species, holotype. 195. Ventral view. 196. Dorsal view. All specimens in AMNH.



Figs. 197–199. Female genitalia of *Eupithecia*. **197.** *E. inepta* Prout, paratype; ventral view. **198,** **199.** *E. usta* Butler. 198. Ventral view. 199. Dorsal view. All specimens in BMNH.

pair arising from common base, then extending distally at right angle, with both pairs

being setose; antennae of females shortly ciliate.

Upper Surface of Wings (figs. 38, 39): Forewings broadly triangular; dark brown, with gray and blackish brown scales, and with reddish brown scaling along cubital vein and on veins in outer part of wing; discal spot prominent, of raised grayish black scales; traces of cross lines weakly indicated by gray scaling, with angulate, divided t. p. line the most prominent; s. t. line white, narrow, angled outwardly on veins; terminal line black, interrupted by veins; fringe narrowly pale at base, then darkened, becoming paler distally, tending to be darkened opposite vein endings. Hind wings brownish gray, with numerous brown scales; discal dot small or obsolescent; extradiscal line weakly represented or absent; terminal line similar to that of forewings; fringe concolorous with wing, similar to that of forewing.

Under Surface of Wings: Forewings pale brownish gray, darker along costal and outer margins; discal dash grayish black, elongate; traces of cross lines indicated on costa, with broad, divided, pale t. p. line extending across wing; ends of veins tending to be pale gray; terminal line and fringe similar to those of upper surface. Hind wings gray, with brown scaling; discal dot small; cross lines obsolescent to partially indicated; terminal line and fringe similar to those of forewings.

Length of Forewings: Males, 8.5 mm; females, 8.5 to 9.5 mm.

Segment VIII (fig. 105): Ventral plate with broad anterior lobes, posterior extension narrowed medially, apical region slightly swollen, arms weakly differentiated, about 15 percent length of plate; tergite with long, slender, biconcave rod anteriorly, a tapering base and elongate posterior extension.

Male Genitalia (fig. 135): Uncus with two widely separated, sclerotized, laterally flattened apical points; anellus with posterodistal margins weakly convex, with narrow sclerotized posterior arms enlarged at ends; valves with broadly sclerotized sacculus, outer margin straight, slightly more than half length of valve, terminating in broad, triangular projection, one on right side slightly longer and more pointed than left one, and with apex of valve broadly rounded; aedeagus with sides almost parallel; vesica apparently with several elongate sclerotized pieces, posterior one narrow, pointed distally, anterior

one broader and shorter, both in area of convoluted membrane, and with tapered basal piece, C-shaped at anterior end.

Female Genitalia (figs. 185, 186): Ductus bursae weakly tapered, with length about equal to width; bursa copulatrix elongate-ovoid, with minutely spiculate surface becoming more densely spiculate posteriorly, having broad, sclerotized, rather poorly defined, concave band extending from ductus bursae for about 40 percent length of bursa, posterior end sharply swollen medially to form angled ridge, margins poorly defined due to decreasing amount of sclerotization, the surface with few longitudinal striations posteriorly, becoming more numerous anteriorly, most numerous on left side of strip, with fewer striations on right side; ductus seminalis arising from ventral surface of bursa at anterior end of sclerotized area on left side from median swelling, extending ventrally or ventroposteriorly and then curving to right side.

TYPES: Butler described *frequens* from two specimens; both are in the BMNH, and have been examined. He stated that the two differed in wing expanse and in some markings on the under surface of the wings, but considered them conspecific. The larger of the two ("expanses of wings, 19 mm"; length of forewing, 8.5 mm) is a male, and was labeled in minute handwriting as the type (fig. 38); the smaller specimen ("expanse of wings, 17 mm"; length of forewings 8.0 mm) is a female, and was labeled by the same person as the "var." (variety) (fig. 39). However, this is not clearly stated in the original description; accordingly, I have placed my lectotype label on the male, and take this opportunity to so designate that specimen. The lectotype has its genitalia mounted on slide Geom.1951-292; the syntype has its structures on slide FHR 19,688. The lectotype has some mold filaments on the right side and antenna, and the basal portions of both wings are worn. Parts of both valves are missing, and the tergite and sternite of the eighth abdominal segment are superimposed; as a result of the latter, plus the fact that both are weakly sclerotized, I have not been able to make out any details of either, with the exception of the base of the ventral plate. Nevertheless, I am quite certain of the determination of this species. Incidentally,

Butler was correct in saying in the original description that his two specimens did indeed represent the same species.

TYPE LOCALITY: Corral, Valdivia Province, Chile.

DISTRIBUTION: The regions of Coquimbo (El Qui Province), Valparaiso (Aconcagua Province), Santiago (Santiago Province), Maule (Curicó, Talca, Cauquenes, and Linares provinces), and Los Lagos (Valdivia Province). These correspond to the Coquimban Desert, Central Andean Cordillera, Central Valley, and Northern Valdivian Forest biotic provinces.

TIME OF FLIGHT: September through January, April, and June; the last month needs verifying before it should be accepted.

REMARKS: Eighteen specimens (4 males, 14 females), one male and one female slide mounts of antennae and legs, and six genitalic dissections (2 males, 4 females) have been studied.

Eupithecia maule, new species

Figures 37, 74, 106, 136, 183, 184

DIAGNOSIS: The wings of this species are short and broad, with the grayish brown forewings being shaded with dark grayish brown along the costa and distally; there is a prominent discal dot and t. p. line. The male antennal segments have an elongate basal pair of setose lobes, almost connected medially, and an anteromedian extension that divides distally, with the lobes of the latter being about half the size of the former. The palpi are grayish brown, and those of both sexes extend beyond the front of the eyes by a distance equal to the diameter of the eyes. The ventral plate is long and slender, narrowed medially, with the slightly swollen apical end having two slender rods. The male genitalia have a strongly projecting sacculus. The female genitalia have the ductus seminalis sagittate distally.

ADULTS: Palpi grayish brown, concolorous with front; palpi of both sexes extending beyond front of eyes a distance equal to diameter of eyes or 0.7 mm. Eyes of both sexes of same size. Antennae of males (fig. 74) shortly bipectinate, with basal pair of setose swellings slender, extending beyond margins of their segments, being almost connected

medially, and with anteromedian extension dividing distally into two setose lobes, latter about half size of former.

Upper Surface of Wings (fig. 37): Forewings broad; grayish brown, tending to be slightly darker along part of costa and distally, and with scattered reddish brown scales in lower and outer portions of wings; maculation obsolescent except for raised, prominent, black discal spot, a broad, grayish white, divided t. p. line, and white, partially represented s. t. line; terminal line dull black, interrupted by veins; fringe concolorous with wing, narrowly darkened opposite veins. Hind wings grayish white, with dark scaling along anal margin and distally; without maculation except for small, dark discal spot, and nebulous s. t. line; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings grayish white with scattered grayish brown scales; with prominent discal dot and indication of broad t. p. line; terminal line and fringe similar to those of upper surface. Hind wings pale grayish white, with some dark brown scaling, especially along anal margin, possibly indicating incomplete cross lines; discal dot small; terminal line and fringe similar to those of upper surface.

Length of Forewings: Holotype, male, 8.0 mm; paratype, female, 8.0 mm.

Segment VIII (fig. 106): Ventral plate elongate, slender, anteriorly with lateral rounded areas, weakly constricted medially, apical region slightly swollen, with slender, pointed arms 25 percent length of plate; tergite scarcely sclerotized.

Male Genitalia (fig. 136): Uncus with posterior point and slight anteroventral swelling, both laterally flattened; anellus large, with straight anterior edge, posteriorly inwardly sloping, with slender, rodlike, curved posterior arms; valves broad, with sacculus sclerotized, outer margin straight, projecting near middle of valve as large, rounded protuberance; aedeagus parallel sided; vesica apparently with some sclerotized, elongate pieces, with most of inner area densely covered with minutely spinose folds, and with angulate, sclerotized basal piece.

Female Genitalia (figs. 183, 184): Ductus bursae weakly tapered, with length about equal to width; bursa copulatrix ovoid, with

minutely spinulate surface, roughly triangular area anterior of broad base of ductus seminalis having irregular longitudinal striations, having concave, sclerotized band extending from ductus bursae for about 40 percent length of bursa, posterior end in form of laterally compressed, slender, convex ridge, medially and posteriorly without ridge but with median strip defined by parallel lateral lines, both sides of band with widely spaced longitudinal striations, more of last on left side than on right, and with striations decreasing in size dorsolaterally; ductus seminalis arising from ventral surface of bursa at anterior end of sclerotized band from wide transverse swelling, longer on left side than on right, extending posteriorly, then broadly widened into sagittate area.

TYPES: Holotype, male, Tregualemu, 600 m, Maule Province, Chile, January 26–27, 1979 (L. E. Peña). Paratype, female, Papos (coastal town), Antofagasta Province, Chile, October 29, 1983 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,457A, and one antenna and a set of legs on FHR 19,457B.

The two type specimens are in the collection of the AMNH.

DISTRIBUTION: The regions of Antofagasta (Antofagasta Province) and Maule (Cauquenes Province). These correspond to the Northern Coast and the Central Valley biotic provinces.

TIME OF FLIGHT: October and January.

REMARKS: Two specimens (1 male, 1 female), one slide mount of male antenna and legs, and two genitalic dissections have been studied.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

***Eupithecia caburgua*, new species**

Figures 40, 187, 188

DIAGNOSIS: This species has forewings that are rather broad and have an elongate apex. The dark brown palpi of the females extend beyond the front of the eyes a distance 1.5 to 1.7 times the diameter of the eyes. The female genitalia have a bursa copulatrix that is elongate and slender, with a broad, striate, weakly sclerotized band between the ductus bursae

and the conical origin of the ductus seminalis. (The males have not been examined.)

ADULTS: Palpi grayish brown to dark brown, with white scaling ventrally; palpi of female extending beyond front of eyes a distance 1.5 to 1.7 times diameter of eyes or 0.7 to 0.8 mm. Antennae of female shortly ciliate.

Upper Surface of Wings (fig. 40): Forewings rather broad, with elongate apex; dark grayish brown, with gray, brown, and grayish black scales, plus dull reddish brown scaling in median area, along cubital vein, and at vein endings; maculation varying from obsolescent to having various zigzag lines present, with prominently divided t. p. line usually most prominent; s. t. line white, outwardly angled in cells; discal dot small, grayish black; terminal line dull black, interrupted by veins; fringe concolorous with wing, darkened at vein endings. Hind wings pale gray, with brown and blackish brown scaling distally and along anal margin; maculation obsolescent except for small, gray discal dot; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings variably gray or brownish gray; maculation obsolescent except for several dark areas on costa, small grayish black discal dot, and partial t. p. line; terminal line and fringe similar to those of upper surface, except for narrower line. Hind wings grayish white, variably marked with brown scales, latter indicating obsolescent cross lines; discal dot grayish black, elongate, small; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, female, 9.0 mm; paratypes, females, 8.5 mm.

Male Genitalia: Unknown.

Female Genitalia (figs. 187, 188): Ductus bursae weakly tapered, with length about equal to width; bursa copulatrix elongate, slender, slightly widened medially, with small swelling mediodorsally, with minutely spinulate surface, having broad, weakly sclerotized, concave band extending from ductus bursae for about 40 percent length of bursa, posterior end broad, evenly rounded, irregular in outline, abruptly raised ventrally from ductus bursae, with slender to minute longitudinal striations, the last continued laterally well into bursa, much more numerous on left side than on right; ductus seminalis

arising from ventral surface of bursa at anterior end of sclerotized area on left side of band, forming prominent conical process, curving posteriorly and slightly dorsally to right side.

TYPES: Holotype, female, Lago Caburgua, Cautín Province, Chile, January 5–12, 1981 (L. E. Peña). Paratypes, both from Chile and collected by L. E. Peña: Río Colorado, 1000 m, Cajon del Maipo, Santiago Province, October 30, 1981, one female; Lago Toro, 700 m, near Puyhue, Osorno Province, February 7–8, 1978, one female. The genitalia of the holotype are mounted on slide FHR 19,522.

The holotype and both paratypes are in the collection of the AMNH.

DISTRIBUTION: The regions of Santiago (Santiago Province), Araucania (Cautin Province), and Los Lagos (Osorno Province). These localities are in the Central Valley, Northern Valdivian Forest, and the Valdivian Forest biotic provinces.

TIME OF FLIGHT: October, January, and February.

REMARKS: Three specimens (all females), one slide mount of antenna and legs, and two genitalic dissections have been studied.

ETYMOLOGY: The specific name is a noun in apposition taken from the type locality.

Eupithecia vallenarensis, new species

Figures 41, 42, 189, 190

DIAGNOSIS: This species has broad forewings with slender black t. a. and t. p. lines. The pale gray palpi of the females extend beyond the front of the eyes a distance 1.3 to 1.5 times the diameter of the eyes. The female genitalia have an ovoid bursa copulatrix, with a very broad, striate, weakly sclerotized band extending from the ductus bursae to the conical origin of the ductus seminalis. (The males have not been examined.)

ADULTS: Palpi pale gray, those of females extending beyond front of eyes a distance 1.3 to 1.5 times diameter of eyes or 0.75 to 0.82 mm. Antennae of females shortly ciliate. Abdomen with second segment black dorsally.

Upper Surface of Wings (figs. 41, 42): Forewings broadly triangular; grayish brown, with dull reddish brown scaling in median area, along cubital vein, and at vein endings; maculation prominent, with slender, black t. a. and t. p. lines, plus black anal vein connecting

the two; black t. a. line with two narrow grayish black lines basally; a small, raised dark gray discal spot; black t. p. line with broad, divided t. p. band distally; s. t. line white, narrow, cut by reddish brown veins; terminal line black, narrow, interrupted by veins; fringe concolorous with wing. Hind wings pale grayish white, with variable number of gray and grayish brown scales, and with area of black scaling on anal margins opposite black abdominal segment; discal dot small, unobtrusive; maculation obsolescent or weakly indicated, with extradiscal line often present; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings pale gray, with grayish black discal dot, area on costa representing t. a. line, and complete t. p. line; terminal line and fringe similar to those of upper surface. Hind wings pale grayish white, with variable number of brown scales; maculation obsolescent except for small grayish black discal spot and partial extradiscal line; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, female, 9.0 mm; paratypes, females, 8.5 to 9.1 mm.

Male Genitalia: Unknown.

Female Genitalia (figs. 189, 190): Ductus bursae slightly tapered, with length about equal to width; bursa copulatrix ovoid, with minutely spinulate surface and broad, elongate area anterior of base of ductus seminalis with irregular longitudinal striations, having concave, very broad, weakly sclerotized band extending from ductus bursae for about 40 percent length of bursa, posterior end broad, coarsely emarginate, abruptly raised ventrally from ductus bursae, with widely spaced longitudinal striations, the last continued laterally into bursa, more numerous on left side than on right; ductus seminalis arising from ventral surface of bursa at anterior end of sclerotized area on left side of band, forming conical process, curving posterodorsally to right side.

TYPES: Holotype, female, Río Conai, SE of Vallenar, high area in Vallenar Valley, Atacama Province, Chile, December 2, 1967 (L. E. Peña). Paratypes, all from Chile: Fray Jorge Forest, W of Ovalle, Coquimbo Province, November 6–9, 1980 (L. E. Peña), one female; Providencia, Santiago Province, October 11, 1947, one female; Santiago (Iz-

quierdo), one female; Estero Leiva, 1000 m, Linares Province, January 8–12, 1953 (L. E. Peña), one female; Mulchen, [Bio-Bio Province], January, 1902, one female. The genitalia of the holotype are mounted on slide FHR 19,463.

The holotype is in the collection of the AMNH; paratypes are in the collections of that institution, the BMNH, and the USNM.

DISTRIBUTION: The regions of Atacama (Huasco Province), Coquimbo (Limari Province), Santiago (Santiago Province), Maule (Linares Province), and Biobío (Biobio Province). These localities are in the Intermediate Desert, Coquimban Desert, Central Valley, and Northern Valdivian Forest biotic provinces.

TIME OF FLIGHT: October, November, December, and January.

REMARKS: Six specimens (all females) and two genitalic dissections have been studied.

ETYMOLOGY: The specific name is an adjective derived from the type locality.

Eupithecia encoensis, new species

Figures 43, 191, 192

DIAGNOSIS: This large species has broad forewings. The blackish brown palpi of the females extend beyond the front of the eyes a distance 1.1 to 1.2 times the diameter of the eyes. The female genitalia have a very wide sclerotized band extending from the ductus bursae to the ductus seminalis. (The males have not been examined.)

ADULTS: Palpi blackish brown, with white scaling ventrally; palpi of females extending beyond front of eyes a distance 1.1 to 1.2 times diameter of eyes or 0.8 mm. Antennae of females shortly ciliate.

Upper Surface of Wings (fig. 43): Forewings broad, with rounded outer margin; badly rubbed and descaled, apparently brown with blackish brown scaling, some of latter on veins; maculation rubbed off except for small, raised, dull black discal dot; terminal line dull black, interrupted by veins. Hind wings pale brownish gray, with brown and blackish brown scaling along anal margin and, to lesser extent, outer margin; maculation obsolescent except for traces of cross lines along anal margin; discal dot absent; terminal line similar to that of forewings.

Under Surface of Wings: Forewings dull

brownish gray, without maculation except for dark gray discal dot and narrow terminal line. Hind wings paler than forewings, with scattered brown scaling; without maculation except for dark gray discal dot and narrow terminal line.

Length of Forewings: Holotype, female, 11.0 mm; paratype, female, 11.5 mm.

Male Genitalia: Unknown.

Female Genitalia (figs. 191, 192): Ductus bursae weakly tapered, with length about equal to width; bursa copulatrix ovoid, with minutely spinulate surface, having short, concave, very broad, sclerotized band extending from ductus bursae for 25 to 33 percent length of bursa, posterior end elevated, with median protrusion, and moderately to widely spaced longitudinal striations, the last continued laterally into bursa, more numerous on left side than on right; ductus seminalis arising from ventral surface of bursa at anterior end of sclerotized area on left side of band, forming conical process, curving posteriorly and then to right side.

TYPES: Holotype, female, Enco, 200 m, E of Lago Riñihue, Valdivia Province, Chile, February 24–26, 1978 (L. E. Peña). Paratype: Pucatrihue (coastal town), Osorno Province, Chile, January 26–31, 1980 (L. E. Peña). The genitalia of the holotype are on slide FHR 19,492.

Both type specimens are in the collection of the AMNH.

DISTRIBUTION: The Region of Los Lagos (Valdivia and Osorno provinces). These are in the Valdivian Forest Biotic Province.

TIME OF FLIGHT: January and February.

REMARKS: Two specimens (both females) and two genitalic dissections have been studied.

At first glance this species can be confused with *spurcata*, due to its large size and brown wings. The present species can be separated from *spurcata* by the characters of its female genitalia, longer palpi, and larger eyes.

ETYMOLOGY: The specific name is an adjective based on the type locality.

GROUP D

The females of this group have each bursa copulatrix with prominent spines encircling the structure; the ductus bursae is laterally sclerotized, with the two lateral margins being

curved medially and slightly overlapping. The males are unknown.

The palpi of the females project beyond the front margin of the eyes by a distance equal to the length of the eyes to 1.75 times their diameter.

The relationships of the included species are uncertain at this time; when males become available, this problem can be solved.

***Eupithecia nublae*, new species**

Figures 44, 193, 194

DIAGNOSIS: This species has elongated, pointed forewings that are dark brown and have a discal dot of raised dark grayish black scales. The grayish black palpi have a small amount of white scaling ventrally, and they extend beyond the front of the eyes by 0.5 mm (females). The female genitalia have a wedge-shaped bursa copulatrix with striate area extending to ductus seminalis, and with median area of prominent but small spines, more extensive dorsally than ventrally. (The males have not been examined.)

ADULTS: Palpi dark grayish black with small amount of white scaling ventrally and on inner surfaces; palpi of females extending beyond front of eyes a distance equal to diameter of eyes or 0.5 mm. Antennae of females shortly ciliate.

Upper Surface of Wings (fig. 44): Forewings elongated, with attenuate apex; unicolorous dark brown, with faint indication of t. p. line and slender, white, more or less zigzag s. t. line; discal dot of raised grayish black scales; terminal line dull black, briefly interrupted by veins; fringe concolorous with wing. Hind wings grayish white anteriorly, becoming dark brown posteriorly; without maculation except for small dark gray discal dot and weak indication of extradiscal dot; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings gray, becoming grayish brown along costa and apically; maculation absent except for dark gray discal dot; terminal line and fringe similar to those of upper surface. Hind wings grayish white, with scattered brown scales; discal dot dark gray, and with broad, indistinct extradiscal line; terminal line and fringe similar to those of forewings.

Length of Forewings: Holotype, female, 10.6 mm.

Male Genitalia: Unknown.

Female Genitalia (figs. 193, 194): Bursa copulatrix elongate, posteriorly wedge-shaped, medially with parallel sides, anteriorly swollen with rounded end; posterior portion lightly sclerotized and with longitudinal striations ventrally, dorsal surface minutely spinulate; median third densely covered with prominent spines, latter covering larger area, being more numerous and slightly smaller on dorsal surface as compared with ventral surface; anterior portion membranous; ductus seminalis arising from raised area on ventral surface, extending ventrally, then angled posteriorly.

TYPE: Holotype, female, Los Lleuques, 4 km E of Recinto, Nuble Province, Chile, September, 1980 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,496.

The holotype is in the collection of the AMNH.

DISTRIBUTION: The Region of Biobio (Ñuble Province); this is in the Northern Valdivian Forest Biotic Province.

TIME OF FLIGHT: September.

REMARKS: One specimen (female) and one genitalic dissection have been studied.

ETYMOLOGY: The specific name is a noun in the genitive case, based on the type locality.

***Eupithecia recintoensis*, new species**

Figures 45, 195, 196

DIAGNOSIS: This small species has short, broad forewings that are brownish gray, with indistinct maculation and a small discal spot. The gray palpi extend beyond the front of the eyes by 0.4 mm (females). The female genitalia have a tubular bursa copulatrix with a prominent ridge extending from the ductus bursae to the ductus seminalis, and with the median area broadly covered with large spines with multilobed bases, most of the dorsal surface being covered by these spines. (The males have not been examined.)

ADULTS: Palpi gray, slightly darkened distally, with latter being concolorous with front; palpi of females extending beyond front of

eyes a distance equal to diameter of eyes or 0.4 mm. Antennae of females shortly ciliate.

Upper Surface of Wings (fig. 45): Forewings short, broad; unicolorous brownish gray; maculation obsolescent except for small dark gray discal spot; terminal line dull black; fringe concolorous with wing. Hind wings slightly paler than forewings except distally; maculation obsolescent except for small dark discal dot; terminal line and fringe similar to those of forewings.

Under Surface of Wings: Forewings gray, becoming broadly brownish gray anteriorly and distally; maculation absent except for traces of cross lines on costa and small dark discal dot; terminal line and fringe similar to those of upper surface. Hind wings grayish white, with brown scales arranged in weak lines; maculation obsolescent except for these indications of cross lines and for round, dark discal dot; terminal line and fringe similar to those of forewing.

Length of Forewings: Holotype, female, 7.0 mm.

Male Genitalia: Unknown.

Female Genitalia (figs. 195, 196): Bursa copulatrix with posterior portion narrow, anterior 67 percent broader, tubular, with rounded end; posteriorly lightly sclerotized, with longitudinal striations, ventral surface with prominent, laterally compressed, sharply pointed ridge extending to ductus seminalis; anteriorly with large spines, each with prominent, multilobed base, spines on dorsal surface covering larger area and more numerous than on ventral surface; anterior end membranous; ductus seminalis arising at anterior end of ventral ridge on ventral surface, then angled posterolaterally to right.

TYPE: Holotype, female, Shangrila, 1500 m, Las Trancas, SE of Recinto, Ñuble Province, Chile, December 15–17, 1983 (L. E. Peña). The genitalia of the holotype are mounted on slide FHR 19,528.

The holotype is in the collection of the AMNH.

DISTRIBUTION: The Region of Biobío (Ñuble Province); this is in the Northern Valdivian Forest Biotic Province.

TIME OF FLIGHT: December.

REMARKS: One specimen (female) and one genitalic dissection have been studied.

ETYMOLOGY: The specific name is an adjective derived from the type locality.

Eupithecia inepta Prout

Figures 46, 47, 197

Eupithecia ? inepta Prout, 1922: 262, pl. 11, fig. 7 (incorrectly given as fig. 8 in text and for caption to pl. 11).

DIAGNOSIS: The forewings of this species have costa weakly curved near the base, a slightly arcuate apex, and are whitish in color, with a darker median area and a small dark brown spot before the apex on the costa. The palpi are very long and slender, with an elongate third segment, and are whitish in color with some dark brown scaling; in the female they extend beyond the front of the eyes a distance equal to 1.75 to 2.00 times the diameter of the eyes. The female genitalia have the ventral surface of the bursa copulatrix with evenly spaced inwardly pointing spines and the mediodorsal surface unornamented; the ductus seminalis arises ventrally halfway between the ductus bursae and the swollen portion of the bursa copulatrix. (The males have not been examined.)

ADULTS: Palpi pale ochraceous, and with dark brown scaling anteroventrally on first segment and basally on second segment, with third segment long and clearly defined, entire structures slightly darker than front; palpi of females extending beyond front of eyes a distance equal to 1.75 to 2.00 times diameter of eyes or 1.3 to 1.5 mm. Antennae of females densely ciliate. Abdomen white, dorsal surface of first segment with dark brown lateral spots, second segment with broad dark brown area posteriorly, remaining segments with median brown spots decreasing in size posteriorly.

Upper Surface of Wings (figs. 46, 47): Forewings large, broad, costa weakly curved near base, with slightly arcuate apex, outer margin weakly concave in upper portion; white, having brown scaling along costa, with scattered pale ochraceous scales, the latter forming a number of slender lines, outwardly curved between veins, in outer portion of median area; discal spot a mixture of raised blackish brown and white scales; t. p. line obsolescent, marked by small, dark brown venular dots;

a dark brown costal spot between 1 and 1.5 mm from apex; s. t. line either of small, dark brown venular dots or obsolescent; subterminal area faintly ochraceous; terminal line pale brown to buff, scarcely interrupted by veins; fringe white, partially ochraceous distally, and weakly darkened opposite some vein endings. Hind wings concolorous with forewings, and having similar pattern; discal spot absent.

Under Surface of Wings: All wings white, with numerous, scattered pale brown scales; maculation of upper surface repeated, slightly darker and more clearly defined, and with dark brown costa spot near base of forewings; hind wings with blackish brown scaling and small discal dot.

Length of Forewings: Females, 10.5 (paratype) to 11.5 (lectotype) mm.

Male Genitalia: Unknown.

Female Genitalia (fig. 197): Bursa copulatrix large, ovate or elliptical, with posterior portion slender, S-shaped; swollen portion of bursa with ventral surface evenly covered with invaginated spines, mediodorsal surface membranous, unornamented; ductus seminalis arising at about middle of ventral surface of posterior S-shaped section.

TYPES: Prout described *inepta* from a series of nine females. The specimen labeled as being the one illustrated with the original description is hereby designated as the lectotype, and bears my label to that effect; its genitalia are mounted on slide FHR 19,764. The lectotype (fig. 46) is in the collection of the BMNH.

TYPE LOCALITY: Masatierra Island, Juan Fernandez Islands, Chile.

DISTRIBUTION: Juan Fernandez Islands; it is not known whether or not this species is found on islands other than Masatierra.

TIME OF FLIGHT: March.

REMARKS: Two specimens and two genital dissections have been studied; both are from the type series.

There is a fair amount of variation in the maculation between the two specimens I have examined; compare figures 46 and 47.

Attention is called to the error in the original description and accompanying figure as to the correct number on plate 11; *inepta* is no. 7 (not 8, as given); this was noted on the label of the lectotype, perhaps by Prout himself.

Eupithecia usta Butler

Figures 48, 198, 199

Eupithecia usta Butler, 1882: 405.

DIAGNOSIS: The large size (length of forewing 12.0 mm) and reddish brown and pale gray upper surface of the forewings will serve to distinguish this species. The female genitalia have an elongate ductus bursae, and the bursa copulatrix is thickly spined except for a membranous area that extends anteriorly of the ductus seminalis for the length of the structure. (The males have not been examined.)

ADULTS: Palpi broken off medially, basal portion white or pale cream colored. Front cream, with bluntly pointed scale tuft ventrally. Antennae of females with segments grayish black basally, whitish distally on upper surface, below with short, dense ciliation.

Upper Surface of Wings (fig. 48): Forewings broadly triangular, with rounded outer margin; reddish brown ("sienna-red" of Butler) and pale gray, with former at base of wing, with slender pale basal line and broad t. a. line of pale gray divided medially by very slender (one or two scales wide) brown line; median area broadly reddish brown, extending to vein Cu_2 between t. a. and t. p. lines, with large, grayish black discal spot of raised scales; median area with lower area pale gray; t. p. line broad, paler than median area, inner margin irregular, outer one smoother and fading out anteriorly; apex of wing along costa broadly dull black, with some gray and brown scaling, 3 mm long; s. t. line white, slender, outwardly angled on darkened lines in cells, becoming obsolescent anteriorly; terminal line brownish black; fringe brown basally, outer portion white with brown scaling opposite veins. Hind wings pale grayish white, with very slender brown and blackish brown cross lines, relatively straight basally, becoming sharply inwardly pointed on veins in outer portion of wing; discal dot dull gray, small; terminal line narrow, dull black; fringe white, with some dark brown scaling opposite vein endings.

Under Surface of Wings: Forewings grayish brown, becoming paler anteromedially; t. a. line represented by dull gray costal patch; discal dot dull black, with dark costal mark near it; t. p. line slightly paler than wing in upper

portion, with wedge-shaped costal mark, then inner margin irregular, both sides of line marked with dark reddish brown scaling on veins; apical area darkened, gradually changing in color in outer portion of wing to become concolorous with latter; s. t. line obsolescent; terminal line similar to that of upper surface but sharply and narrowly interrupted by pale scales at end of veins; fringe similar to that of upper surface. Hind wings similar to upper surface but slightly paler, and with narrow brown cross lines more prominent; discal spot dull black, prominent; terminal line and fringe similar to those of forewings.

Length of Forewings: Female, 12.0 mm (holotype).

Segment VIII: Unknown.

Male Genitalia: Unknown.

Female Genitalia (figs. 198, 199): Ductus bursae 3.0 mm long, sclerotized, slender, with parallel sides; bursa copulatrix appearing ovoid, posterior portion membranous, more strongly developed to left side (dorsally?) than to right, anterior three-fourths thickly set with invaginated, prominent spines, becoming more linear to right (ventral?) side, with wedge-shaped membranous area at anterior end extending posteriorly, and with right (ventral?) side membranous for four-fifths its length; ductus seminalis large, arising on right (ventral?) side, extending posteriorly. (The

above description is based on the slide of the holotype; the genitalia have been severely flattened, appearing almost two dimensional. As I interpret the structures, the ductus seminalis probably should be more or less ventrally located in the rather wide membranous area, with both sides and the dorsal surface spinose.)

TYPE: Holotype, female, with its genitalia mounted on slide Geom: 1951-315, in the BMNH; both examined. The type (fig. 48) is in quite good condition, with only a few rubbed areas, but the distal portion of the palpi are missing.

TYPE LOCALITY: Chile, without additional data, except "From Reed's collection" (Butler, 1882: 406). Butler described several species in this paper with the same notation; the only localities given for Reed's material were Valparaiso and "Chiloë," and these were in the great minority.

DISTRIBUTION: Chile. It is possible that either Valparaiso or Chiloé might be where the species occurred, but this is by no means certain.

REMARKS: One female (the holotype) and one genitalic dissection have been studied. This is one of the most distinctive members of the genus that is found in Chile, based on its size, color pattern, and genitalia.

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