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Nesting Biology of the Bee *Ashmeadiella holtii* and Its Cleptoparasite, a New Species of *Stelis* (Apoidea: Megachilidae)

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ABSTRACT

The nesting biology of *Ashmeadiella* (*Chilosima*) *holtii* Cockerell is described including: features of nesting site; nest architecture; provisions; and some aspects of development. Unlike other known species in the genus, *holtii* nests in the ground as did a female of *A.* (*Ashmeadiella*) *leucozona* Cockerell at the same site.

A new species of *Stelis* parasitized nests of *A. holtii*. It is described and named *elongativentris*, NEW SPECIES, in an appendix by Frank D. Parker. Its biology is presented including: searching behavior of female; oviposition; larval feeding habits; larval host searching behavior; defecation; and cocoon spinning. First- and last-stage larvae are described taxonomically and compared with other known larvae of cleptoparasitic Anthidiini.

INTRODUCTION

Little has been published on the nesting biology of the large North American genus *Ashmeadiella,* a megachilid related to *Osmia,* except for the works of Krombein (1967) and Parker and Bohart (1966, 1968). Whereas these authors reported on twig- and trap-nesting species, I here give information on the ground-nesting *Ashmeadiella* (*Chilosima*) *holtii* Cockerell (Megachilini). It has as its cleptoparasite, *Stelis elongativentris* Parker (Anthidiini), new species, the description of which is appended. The mode of nest parasitism of cleptoparasitic Anthidiini varies depending on the genus and perhaps on the species (e.g., Bennett, 1966; Iwata, 1976; Michener, 1955; Rust and Thorp, 1973). I therefore offer such information on *elongativentris.* I also describe the first and last lar-

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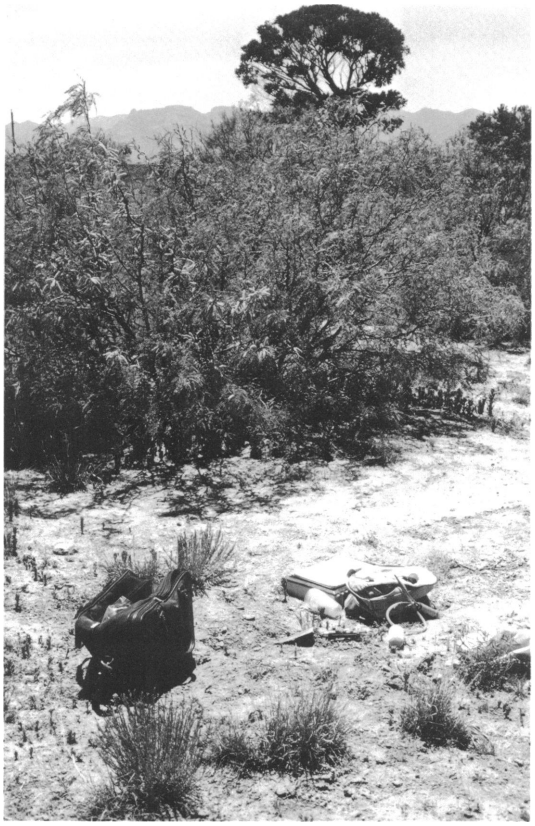


Fig. 1. Nesting area of *Ashmeadiella holtii,* near Cienega Ranch, Hidalgo County, New Mexico. Nest entrances were scattered over surface in foreground.

val instars of *elongativentris* because larval anatomy reflects mode of parasitism in this tribe. The works of Michener (1953), Rozen (1966), and Rust and Thorp (1973) make possible a comparison of larval *elongativentris* with other cleptoparasitic Anthidiini.

ACKNOWLEDGMENTS

I wish to thank Dr. Frank D. Parker, USDA Bee Biology and Systematic Lab, Logan, Utah, for the bee identifications and for the appended description. I carried out the field research while at the Southwestern Research Station of the American Museum of Natural History, Portal, Arizona. Frank D. Parker and Richard W. Rust critically reviewed the manuscript and made helpful suggestions.

OBSERVATIONS

DESCRIPTION OF NESTING AREA: Females of *Ashmeadiella holtii* nested on one side of an unpaved road leading to Cienega, adjacent to Cienega Ranch, Hidalgo County, New Mexico. I identified the site on May 12, 1986, and excavated it from then through May 14. Mesquite (*Prosopis juliflora*) and creosote bush (*Larrea tridentata*) dominated and the blooming *Prosopis* may have been the pollen source for the *Ashmeadiella. Ashmeadiella* males and adults of the cuckoo bee *Stelis elongativentris* flew close over the ground on both sides of the road where there was little or no vegetation between the sparse herbs (fig. 1). Nest entrances were unshaded by vegetation during the main part of the day. The dry, fine-grained surface soil contained few stones or roots.

A female of *A.* (*Ashmeadiella*) *leucozona* Cockerell had constructed a nest in the ground at the site. Although size and depth were the same as that of *A. holtii,* the nest was immediately distinguished by the bright green, masticated leaf tissue that coated the wall of its single, still-open cell.

Biology of *Ashmeadiella holtii*

DESCRIPTION OF NESTS: The nest entrances of *Ashmeadiella holtii* were widely scattered and hidden under dry clumps of grass, cattle feces, twigs, or stones. I usually found them by seeing a female enter a nest or a *Stelis* female exploring a potential nest entrance. The only surface clue was a small amount of loose, coarse, dry excavated soil usually to one side of a hole. All nine nests discovered had open entrances. Each consisted of a single main tunnel, without laterals, ending in a cell series (fig. 2). The tunnel descended obliquely, roughly at a 45° angle, and was straight or sometimes curved. Many, but not all, burrows possessed a distinct septum less than 1 mm thick in the center, placed part way down the tunnel. Composed of hardened soil, a septum was indistinguishable from a cell closure. It had a concave, even top surface and a flat to slightly convex, bumpy lower surface. Dark in color, it appeared to have been made from soil moistened by the female bee, just as was the case with cell closures. Hence, a septum was different from the plug of un-

consolidated soil characteristic of many bees. Below as well as above the septum the open burrow possessed a rough, uneven surface that lacked a lining.

Tunnels were 3.5–4.0 mm in diameter and short, ranging in length from 1.5 to 4.0 cm, so that the depth of the first (last constructed) cell in a series was 1–4 cm below the surface.

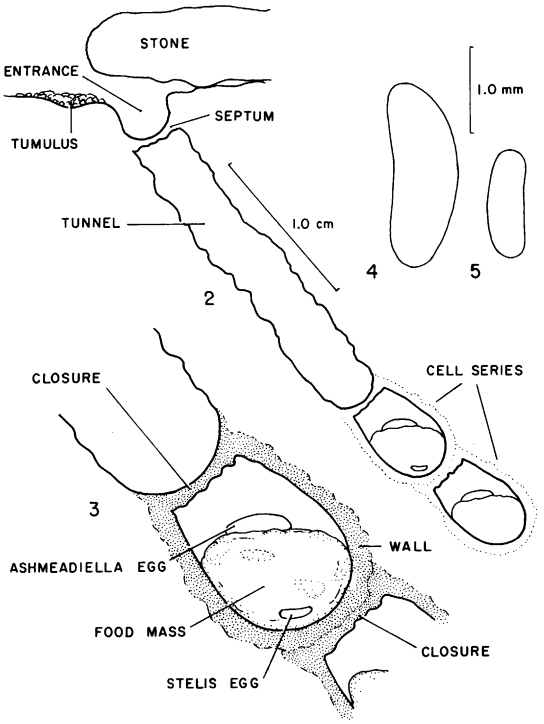
The number of cells (fig. 3) in the series varied from one to four, and nests probably never contained more than four cells because of the proximity of the first cell to the earth's surface. Cells were tilted at a 30–45° angle from horizontal, closure end higher than rear, and possessed a wall of soil roughly 0.5 mm thick, harder, and darker (wet soil color) than the substrate. The wall and its inner surface contained no obvious plant parts (such as masticated leaves); however, the hardening substance may have been nectar. The cell surface was smooth, dull, without a distinct lining, and absorbed water droplets more slowly than the immediate substrate. A piece of cell wall, when placed in water, completely "melted," leaving no trace of waterproof lining. Cells were 3.8–4.0 mm in maximum diameter (N = 4) and 4.6–6.0 mm in length (N = 3).

Overall cell shapes (fig. 3) were elongate ovals rounded at the rear. They seemed to vary so that I could not determine whether they were symmetrical around their long axes.

Cell closures (fig. 3) were flat to slightly convex on the inside where the more or less bumpy surface suggested some sort of nonrandom pattern. However, no certain spiral was obvious. Identical in thickness and shape to septa, closures were dark like the cell wall and had an inner diameter of 2.6–3.0 mm (N = 4). Their outer surface was even, usually concave, but sometimes slightly bulging in the center.

Cells in series abutted one another without an intercalary space (either soil filled or unfilled) between the closure of the rear cell and the rear of the preceding cell (figs. 2, 3).

PROVISIONS: The stored food (fig. 3) consisted of a moist sticky yellow pollen, a semifluid that clung to forceps when it was penetrated. Krombein (1967) reported sticky provisions for several other species of *Ashmeadiella*. The shape of the mass conformed but did not adhere to the lower rear of the



Figs. 2, 3. Nest of *Ashmeadiella holtii*. **2.** Side view; **3.** first cell, enlarged, showing position of eggs of *holtii* and *Stelis elongativentris* on food mass. Figs. **4, 5.** Eggs of *A. holtii* and *S. elongativentris*, respectively, showing differences in size. Scales refer to figure 2 and figures 4 and 5, respectively.

cell, and its top surface was either horizontal or slanting forward. When viewed from the top it was circular, in one case measuring 3.6 mm in diameter. When removed from a cell and placed on a table its undersurface slowly conformed to the flat table top. The surface of the provisions was somewhat irregular and was covered on all sides with uneven patches of dry pollen which may function to prevent the sticky provisions from adhering to, and thereby losing moisture through, the semipermeable cell wall. In one open cell partial stores were massed toward the rear and revealed no host or *Stelis* eggs.

Eggs of *Ashmeadiella holtii* (figs. 3, 4) were translucent white, shiny, and thick in relation to length. Two measured 1.8 and 1.9 mm long. One was 0.82 mm in maximum diameter as viewed from the top and another 0.6 mm in maximum diameter as viewed from the side. Eggs were placed on the middle

of the upper surface of the food masses, generally in the sagittal plane of the cells, so that their more slender, tapering anterior sections pointed toward the closures. One egg, however, was crosswise on top of the food mass. Its position may have been an accident of oviposition or the result of manipulation by a *Stelis* female (a *Stelis* egg was also found in the cell, see below). Early instars fed in the same position that the egg had occupied. One larva, presumably a third instar, had the two previous cast larval skins attached to its rear venter, an indication that larvae do not crawl but feed in situ during much, if not all, of the stadium. Because a similar situation was noticed for *Pararhophites orobinus* (Morawitz), a distantly related megachilid (McGinley and Rozen, in press), such feeding behavior may be found widely in the family.

ADULT BEHAVIOR: Adult *Ashmeadiella holtii* were active in midday. Males patrolled both the nesting area and another area close to blooming mesquite. I saw males and females tumbling on the ground for several seconds, presumably attempting to mate. Males flew swiftly close to the ground and occasionally landed briefly. They did not investigate potential nest entrances, as was characteristic of the flight of *Stelis* females.

Biology of *Stelis elongativentris*

Numerous individuals of this cleptoparasite (presumably mostly females) flew over a wide area in which *Ashmeadiella* nests occurred. Their flight was moderately swift and close to the ground. They often slowed around holes and sometimes alighted before entering a potential burrow entrance. Their flight resembled similar activities on the part of female Nomadinae.

On two or three occasions several *Stelis* adults flew around a female *Ashmeadiella holtii* as she was trying to enter her nest. Whether the parasites were attempting to follow the host into the nest or merely to identify the entrance for future exploitation is unknown. Such close associations between host and cleptoparasitic females are unusual in my experience. Matthews (1965) and Rust and Thorp (1973) give interesting accounts of *Stelis*-host adult interactions.

Many of the *Ashmeadiella* cells contained immatures of *Stelis*. Although a tabulation could not be kept, the parasitism rate could have easily been 50 percent. Graenicher (1905) recorded that 62 percent of the cells of *Hoplitis producta* (Cresson) contained immatures of *Stelis lateralis* Cresson (as *sexmaculatus*). Rust and Thorp (1973) pointed out that with *Stelis chlorocyanea* (Cockerell) and its host *Osmia nigrifrons* Cresson, the parasitism rate was 90 percent early in the nest season and 0 percent at the end of the season.

Most parasitized cells contained a single *Stelis* egg, but two cells each contained two eggs (or early larvae) of *Stelis*, an indication either that some *Stelis* females oviposit twice in a cell or that two *Stelis* females found the same cell. The white, slightly curved *Stelis* eggs (fig. 5), substantially smaller than the host eggs, were 1.0–1.1 mm long (N = 3) and 0.375 mm in maximum diameter (N = 2). They had a smooth transparent chorion, and both ends were nearly identically rounded. All were attached lengthwise to the food masses, and, when the food masses were pulled away from the cell walls, *Stelis* eggs always adhered to the masses. In three (and perhaps all other) cases that could be carefully observed, eggs were between the provisions and the rear wall or the rear floor. I saw no special chamber surrounding them; the soft food seemed to cushion them closely. Eggs were not inserted in the cell wall as is in the Nomadinae.

Stelis eggs hatched into small, relatively inactive larvae with bidentate, apically normal (for anthidiines) mandibles (fig. 14). [Rust and Thorp (1973) reported that the first instar of *Stelis chlorocyanea* can destroy the host, although it usually does not.] One first instar, still partly in its chorion, already had ingested yellow pollen. In at least four cells with *Stelis* eggs, *Ashmeadiella* eggs remained in position in the sagittal plane of the cell, an indication that adult *S. elongativentris* do not remove (or destroy) the host immatures as is the case with *Odontostelis bilineolata* (Spinola) (Bennett, 1966). In one cell containing a *Stelis* egg the host egg was crosswise to its normal position and seemed more deeply embedded in the provisions than normal. It was impossible to determine whether the cleptoparasite female had repositioned it, and, if she had, what the significance of doing so might be.

Alexander and Rozen (1987) reported that the number of ovarioles was three per ovary (typical for Megachilidae) and that mature oocytes averaged 0.44 per ovariole (N = 3) for *Stelis elongativentris* (as *Stelis sp. A*).

The time of oviposition of the cleptoparasite is not certainly known. A *Stelis* female may enter the cell before it is fully provisioned and place an egg behind or under the partial stores, or she may open a closed cell, insert her egg, and close the cell again, provided that the host female has departed. Because cell closures vary from quite smooth to very rough on the inside, I looked for evidence that one texture of closure might be associated with parasitized cells. However, *Stelis* immatures were found in cells with smooth as well as rough inner closures. Because I saw no *Stelis* females attempting to enter the few nests replete with cells (and therefore complete), I tentatively hypothesize that this species enters and deposits in cells still being provisioned, as is the case with *S. chlorocyanea* (Rust and Thorp, 1973) and *S. lateralis* (Michener, 1955).

The consistency of the provisions raises questions as to how a female *Stelis elongativentris* can insert an egg between the sticky provisions and the cell wall without becoming entangled. Interestingly, the apical metasomal segments of the female (fig. 15) dorsally and laterally possess long, erect, basally stiff but apically tapering bristles which may enable the ovipositing bee to push aside the stored food without being entrapped by it. Parker, in the appended description, notes that these erect setae on tergum 6 are taxonomically diagnostic. Although some other species of *Stelis* also exhibit these special setae, still others do not. Attempts should be made to correlate the presence of long, erect apical metasomal setae with mode of parasitism and with consistency of host provisions in the genus.

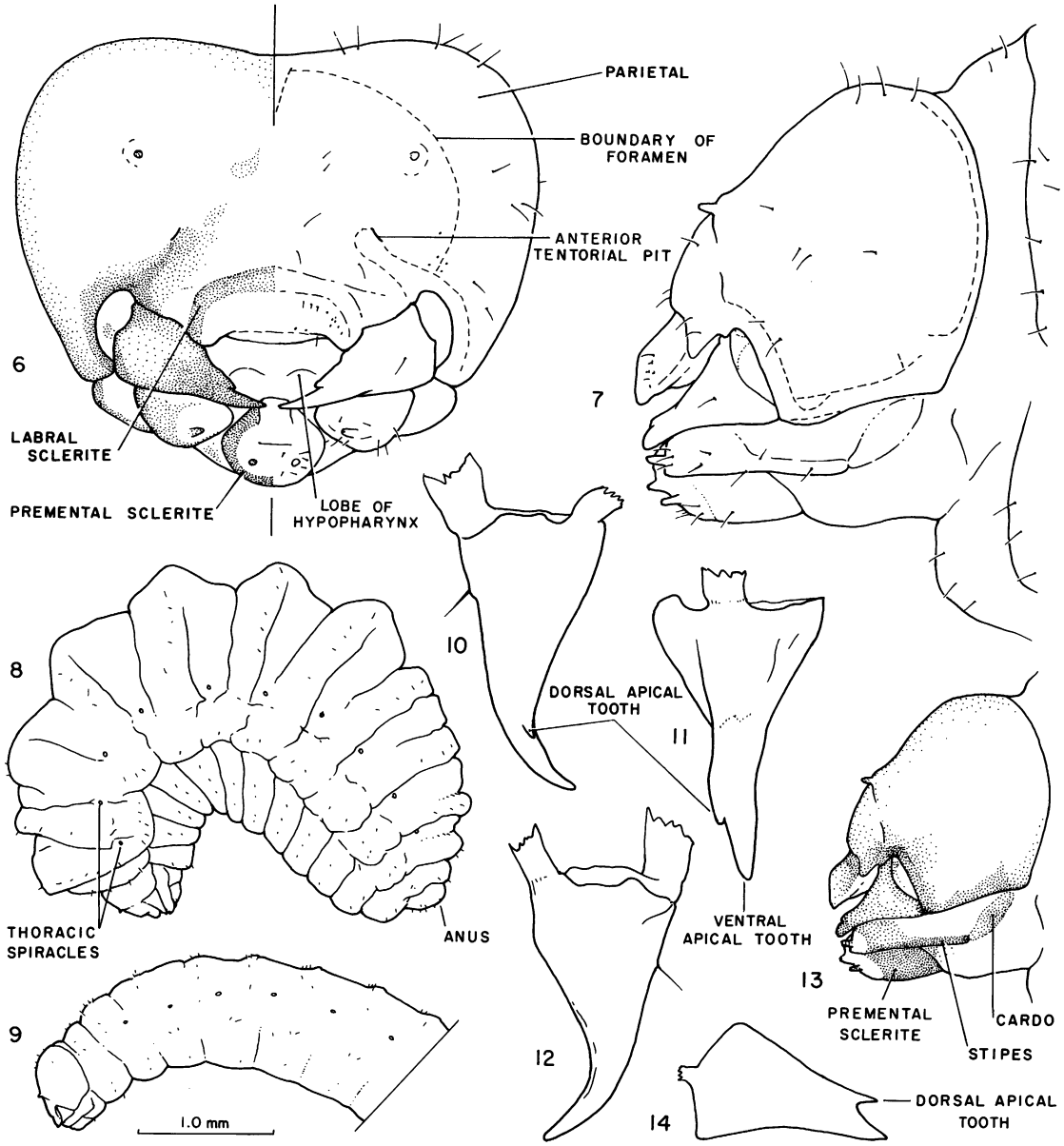
Because of short bidentate mandibles and sedentary activity pattern, first instars seemed incapable of killing the host eggs or larvae [although Rust and Thorp (1973) reported that the first instar of *Stelis chlorocyanea* can kill the host]. However, subsequent instars developed long, sharp-pointed, darkly pigmented mandibles with a small upper tooth subapical in position (figs. 10–12). Although my observations were limited, I saw nothing inconsistent between the behavior of this species and the descriptions of larval behavior of *S. lateralis* (Michener, 1955) and *chlorocyanea* (Rust and Thorp, 1973). Larvae of all three species work their way through (or more probably alongside) the provisions, find and kill the host immatures, and then return to consuming the food. When touched with forceps on one side, the larva of *S. elongativentris* turned and bit the point of the forceps on a number of occasions, a behavior typical for *Stelis* larvae.

One last-stage larva started defecating before the provisions were much less than half eaten, so that defecation is carried out through much of the larval stadium, as has been recorded by others (see Michener, 1955). Last larval instars (fig. 9) were relatively slender. They had large heads relative to their bodies at first and took on their robust (fig. 8) appearance only toward the end of feeding. Only one larva survived long enough to spin a cocoon which was dark brown and misshapen because it was spun in an artificial container.

DESCRIPTION OF MATURE LARVA OF *STELIS ELONGATIVENTRIS*

Figures 6–13

DIAGNOSIS: Comparisons of this larva with specimens of *Stelis lateralis* and *Odontostelis bilineolata* and with the description of *S. chlorocyanea* (Rust and Thorp, 1973) show that *S. lateralis, elongativentris,* and *chlorocyanea* share many features and can be immediately distinguished from *O. bilineolata* on the basis of the very differently shaped mandibles and head capsules, and of the degree of spiculation of body integument (densely covered with setaform spicules in *O. bilineolata*; without such spicules in other three species). *Stelis lateralis* and *chlorocyanea* have apically simple mandibles, whereas *S. elongativentris* (figs. 10, 11) has apically bidentate mandibles. [The mature larva of *Heterostelis hurdi* Thorp was depicted by Thorp (1966) as having apically bidentate mandibles, but the larva of this species needs to be reexamined in light of present knowledge so that additional comparisons can be drawn between it and the other parasitic anthidiines.]



Figs. 6–14. Larvae of *Stelis elongativentris*. **6, 7.** Head capsule of mature larva, frontal and lateral views, respectively; **8.** postdefecating larva, lateral view; **9.** early last instar, lateral view (posterior part of body distorted in preservation; hence not illustrated); **10–12.** right mandible of mature larva, dorsal, adoral, and ventral views, respectively; **13.** head capsule of mature larva showing pattern of pigmentation, lateral view; **14.** right mandible of first instar, outer view.

HEAD (figs. 6, 7, 13): Integument with scattered long setae, about as numerous as those of *Odontostelis bilineolata, Stelis lateralis,* and *S. chlorocyanea*; integument without spicules; head capsule somewhat pigmented except hypostomal ridge, pleurostomal ridge, lateral arms of epitomal ridge distinctly more pigmented; frontal area bearing one or more pigmented irregular spots on each side (these pigmented areas are quite variable in size and distribution and are not associated with thick internal sclerotization); antennal papilla pig-

mented; labral sclerite darkly pigmented; cardo and stipes very darkly pigmented; much of outer apical surface of maxilla pigmented; premental sclerite ["narrow pigmented sclerite of prementum" of Rozen (1966)] moderately darkly pigmented, much more pronounced than in *O. bilineolata*; vague sclerite on each side of postmentum next to maxilla; integument of parietals, like that of *S. lateralis,* internally scarred, not smooth like that of *O. bilineolata.* Tentorium strongly developed except dorsal arms short; posterior tentorial pits conspicuous in normal position; posterior thickening of head capsule well developed; hypostomal ridge strongly developed; pleurostomal ridge and lateral arms of epistomal ridge well developed; median portion of epistomal ridge absent between anterior tentorial pits; longitudinal thickening of head capsule vaguely developed dorsally; cleavage lines and parietal bands absent. Parietals enlarged so that horizontal diameter of foramen considerably narrower than maximum width of head capsule; hence parietal similar to but even more exaggerated than those of *S. lateralis* and very different from those of *O. bilineolata* in which horizontal width of foramen is only slightly shorter than width of capsule. Antennal papilla elongate, as in *O. bilineolata* and *S. lateralis,* arising from very low prominence, lower than that of *S. chlorocyanea.* Labral sclerite well developed, pigmented; labral apex broadly emarginate, without tubercles. Mandible (figs. 10–12) apically bidentate but ventral tooth extremely long, tapering; dorsal apical edge without distinct teeth; apical margin between teeth smooth; apical concavity and cusp not evident. Maxilla with apex produced adorally; galea absent; palpus elongate, similar in length to labial palpus and antennal papilla; cardo and stipes strongly sclerotized, pigmented; outer apical surface of maxilla sclerotized, somewhat pigmented; articulating arm of stipital sclerite well developed, articulating with but distinct from premental sclerite. Labium strongly projecting, divided into prementum and postmentum; premental sclerite well developed, darkly pigmented, ending dorsally where apex of labium projects dorsally; salivary opening a transverse slit between projecting lips at apex of labium; dorsal surface more or less continuous with dorsal surface of labium; hypopharynx bearing widely spaced lobes as in *S. lateralis* and *O. bilineolata.*

BODY: Form (fig. 8) of postdefecating larva robust; large middorsal tubercles present between thoracic segment 3 and abdominal segment 1, abdominal segments 1 and 2, 2 and 3, 3 and 4, and 4 and 5, but not posterior to this; these tubercles less evident in early last instar; ventrolateral tubercles moderately pronounced. Integument of postdefecating form soft, minutely spiculate in some areas, and bearing sparse, long setae distributed approximately as in figures 8, 9; pilosity approximately as in *Stelis lateralis* and probably *chlorocyanea.* Thoracic spiracles smaller in diameter than abdominal ones (also true for *Odontostelis bilineolata* and perhaps also for *S. lateralis*); posterior two pairs of abdominal spiracles apparently somewhat smaller than more anterior abdominal spiracles; atrial wall with rows of moderately sparse denticles; atrium projecting above body wall and with rim; peritreme present; primary tracheal opening with collar; subatrium short, with approximately six chambers. Sexual characters unknown. Anus situated dorsally.

MATERIAL STUDIED: Two postdefecating larvae, Cienega Ranch, Hidalgo County, New Mexico, collected as egg or small larva on May 14, 1986, preserved July 18, 1986 (J. G. Rozen), from nests of *Ashmeadiella holtii.*

REMARKS: The internal scarring of the parietals is probably associated with the attachment of strong adductor mandibular muscles in *Stelis lateralis* and *elongativentris.* These features and the globose, heavily sclerotized parietals presumably reflect the need for the mature larvae (and perhaps earlier instars) to close forcefully their elongate mandibles in the process of killing host immatures. The globose parietals provide a large and strong structure for the attachment of the adoral mandibular muscles. Because of the mode of parasitism, I predict that *S. chlorocyanea* will agree with these two species in regard to the condition of the parietals. These modifications are absent in *Odontostelis bilineolata* larvae, which do not kill the host.

Middorsal body tubercles are characteristic of various anthidiines and seem especially well developed in *Stelis.* These tubercles fall

between segments and therefore cannot be assigned to a particular segment in my judgment. In *S. elongativentris* they appear to be eversible and may assist the larva in moving from where it hatched to the larva of the host. Although these tubercles in this species seem to be very large and less discrete than those illustrated by Michener (1953) for *S. lateralis,* his specimen was predefecating so that meaningful comparisons are difficult. Furthermore, the tubercles were scarcely evident on an early last instar of *S. elongativentris* (fig. 9).

Although Rozen (1966) stated that the postdefecating larva of *Odontostelis bilineolata* was more or less evenly and densely covered with fine setae, a reexamination of specimens revealed that its integument was covered mostly with setaform spicules, giving it a hairy, almost fuzzy appearance. An examination of a larval *Megachile* showed that its integument also appears hairy because of setaform spicules (although some setae of equal length were intermixed). Long body setae on bee larvae have traditionally been considered a wasplike feature that was therefore plesiomorphic. However, setaform spicules are not plesiomorphic and therefore the polarity of character sets dealing with this feature must be reconsidered in the future.

DESCRIPTION OF THE FIRST INSTAR OF *STELIS ELONGATIVENTRIS*

Figure 14

DIAGNOSIS: This instar strongly resembles the first-stage larva of *Odontostelis bilineolata* (Rozen, 1966) and of *Stelis chlorocyanea* (Rust and Thorp, 1973). It differs from *O. bilineolata* in that the upper apical mandibular tooth (fig. 14) is substantially smaller than the lower apical tooth whereas in *bilineolata* the two teeth are more nearly equal. In *S. chlorocyanea* the upper apical tooth is even smaller than that of *S. elongativentris.*

LENGTH: Approximately 1.5 mm (larva had already consumed some pollen).

HEAD: Integument without setae and sensilla that could be seen using stereoscopic microscope (150×) (sensilla faintly visible with compound microscope); integument unpigmented except for faintly tinged hypostomal ridge and perhaps some other internal ridges. Head hypognathous as in *Odontostelis bilineolata* and *Stelis chlorocyanea,* not prognathus as in first instars of many Nomadinae. Tentorium complete; posterior thickening of head capsule, hypostomal ridge, pleurostomal ridge, and lateral arms of epistomal ridge moderately developed; epistomal ridge between anterior tentorial pits absent; gena projecting little if at all downward so as to cover hypostomal ridge anteriorly; longitudinal thickening of head capsule moderately well developed above; cleavage lines and parietal bands not evident. Antennal papillae slightly produced. Labral apex broadly emarginate, without tubercles. Mandible (fig. 14) apically bidentate, with ventral tooth much larger than dorsal one. Maxillary apex produced adorally; galea and palpus not evident; cardo and stipes faintly sclerotic. Labium recessed, not divided in prementum and postmentum; salivary opening apparently present; palpi not visible.

BODY: Form moderately robust, straight, not greatly tapering at either end, thickest in middle; intrasegmental lines and middorsal tubercles not clearly present. Integument without setae but with numerous, small, nonsetaform spicules over much of surface. Thoracic spiracles apparently rudimentary, nonfunctional (not connected by well-developed trachea to rest of respiratory system); first six pairs of abdominal spiracles moderate in size; atrium apparently finally annulated, not projecting above body wall; peritreme and primary tracheal opening difficult to observe; last two pairs of abdominal spiracles apparently rudimentary, nonfunctional. Anus apical in position, rather than dorsal as in *Odontostelis bilineolata.*

MATERIAL STUDIED: One first instar, Cienega Ranch, Hidalgo County, New Mexico, May 12, 1986 (J. G. Rozen), from cells of *Ashmeadiella holtii.*

REMARKS: In spite of a few apparent differences, this larva resembles first instars of both *Odontostelis bilineolata* (Rozen, 1966) and *Stelis chlorocyanea* (Rust and Thorp, 1973). Spiracles of all should be carefully checked for size differences, as indicated in the description.

APPENDIX

STELIS ELONGATIVENTRIS, NEW SPECIES

by Frank D. Parker

Figure 15

HOLOTYPE FEMALE: Length 5.5 mm, wings 4.3 mm. Body black except the following ferruginous: mandibles, except tip, labrum, mouthparts, apically on clypeus, malar area, basal part of femora, tibiae, tarsi, spot on tegulae, base of wings, basoventrally on terga (less on apical ones), apical margin of sterna 1–5, sternum 6 apically, basally; wings hyaline; flagellomeres light brown; creamy white markings along inner margin of compound eye, band across vertex but interrupted medially, lateral spots on anterior margin of scutum, pronotal lobe, tegula except middle, apical bands on terga 1–4, those on terga 1, 2 with isolated lateral black spot, on terga 3, 4 white circle interrupted basally, tergum 5 with median spot. Pubescence white, short, covering surface on face, gena, scutum, scutellum; terga with apical band of short, plumose hairs, laterally with tuft of erect setae; tergum 6 with longer erect hair covering most of surface, bordered by shorter white hair; sterna with similar apical hair bands. Punctation close, but separate on head; pits larger, more distinct on scutum, scutellum; propodeal pit row with 2 or 3 large lateral cells, medially pitted, hind face shiny; terga with narrow impunctate bands hidden by plumose hair bands; terga mediobasally closely pitted, punctures larger, closer on apical terga; sterna 1–4 densely pitted; sterna 5, 6 with smaller, dense pits, sternum 6 more so than 5. Clypeal margin crenulate medially; head measurements as follows: distance between lateral ocelli same as ocellocular distance and ocular to postocular distances; distance between lateral ocelli and midocellus less than half (0.4×) distance between lateral ocelli; eyes converging below, distance between eyes at base less (0.7×) than distance at top of eyes; terga not crimped laterally; tergum 6 nearly as long as broad, apically tapered, tip rounded; sterna 6 twice as long as broad, pseudomargin extended into elongate point.

MALE: Similar to female except less red markings on body; sternum 1 with low subapical lamella; terga 2, 3 flat, apical margin slightly depressed; comb on sternum 4 minute (less than ⅙ width of sternum), sternum 5 with apical margin concave, deep medially; sternum 6 apically extended to a fine point.

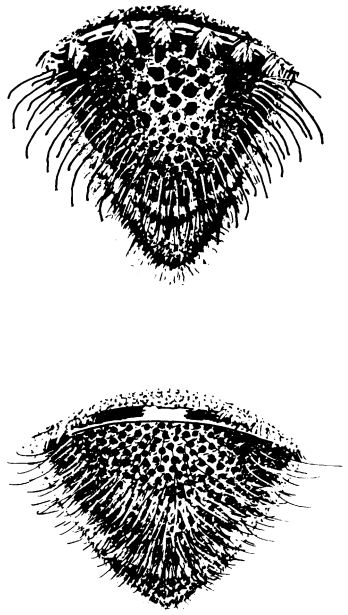


Fig. 15. Apex of metasoma, dorsal views, of *Stelis* females, showing terga 6 and apical portion of sternum 6. *S. elongativentris* above, *S. palmarum* below.

TYPE LOCALITIES: Holotype female. ARIZONA: 3 mi SW Wickenburg, V-5-64 (Torchio and Bohart) USNM #100074. Paratypes, 14 females, 46 males, from the following locations: NEW MEXICO: 11 mi N Rodeo, Hidalgo Co., V-1-69, V-4-69 (J. G. Rozen and M. Favreau); Mesilla Park, Dona Co., V-7 (Cockerell); Cienega Ranch, Hidalgo Co., V-12-86 (J. G. Rozen). ARIZONA: Silver Bell Bajada, I.B.P. desert scrub site, Pima Co., #91315 (J. L. Neff); 7.5 mi E Apache, Cochise Co., IV-21-61 (Rozen and Schrammel); Elfrida, Cochise Co., V-2-56 (F. Werner and G. Butler) on alfalfa: Texas Canyon, Dragoon Mts., Cochise Co., V-29-65 (M. E. Irwin); 2.5 mi SW Congress, Yavapai Co., V-13-75 (R. R. Snelling); Keating Canyon, Chiricahua Mts., Cochise Co., V-8-56 (M. Statham): Sahuarita, Pima Co., V-2-57, V-8-57 (G. Butler and F. Werner) on mesquite; 25 mi E Doug-

las, Cochise Co., IV-18-61 (W.E.L.) on *Prosopis*; 15 mi SW and 20 mi NW Wickenburg, Maricopa Co., V-5-64 (G. Bohart and P. Torchio). CALIFORNIA: 20 mi S Needles, San Bernardino Co., V-3-64 (P. Torchio and G. Bohart); 16 mi SW Baker, San Bernardino Co., IV-25-77 (J. Powell) on *Prosopis*. MEXICO: *Sonora:* 12 mi W Ciudad Obregón, IV-25-61 (R. H. and E. M. Painter).

VARIATION: There are fewer whitish markings on some specimens, especially on the apical terga.

SYSTEMATICS: *Stelis elongativentris* is one of the three species in the Palmarum group. *Stelis palmarum* (Timberlake) can be distinguished by its dark hind tarsi and carinate pronotal lobe; *elongativentris* and another undescribed species have yellowish to reddish hind tarsi and the pronotal lobe is rounded. Females of *elongativentris* and *palmarum* are easily separated by the distinctive shape of tergum 6 (fig. 15).

RANGE: *Stelis elongativentris* is found in the hot desert regions of the southwestern United States and northern Mexico. Specimens have been collected only in the spring from April to May, some by sweeping alfalfa and mesquite.

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