REVISION AND ANALYSIS OF *PSEUDOSALDULA* COBBEN (INSECTA: HEMIPTERA: SALDIDAE): A GROUP WITH A CLASSIC ANDEAN DISTRIBUTION

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CONTENTS

PART 1:
SYSTEMATICS

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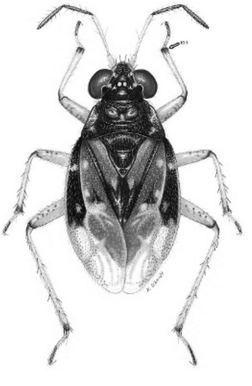


ABSTRACT

The genus *Pseudosaldula* Cobben, which is restricted to the Andean Subregion of South America, is revised. Fourteen valid species are recognized, nine of them being described as new and 10 previously published names are treated as junior synonyms based on the examination of approximately 3500 specimens from Colombia, Ecuador, Peru, Bolivia, Argentina, and Chile. All taxa are described or redescribed. A key to the species is provided. Color habitus illustrations, distributional maps, and detailed measurements are provided for all species. Scanning electron micrographs of the vestiture, parameres, parandria, face, and pretarsus are provided for representative species, as are color views of the face and the nymphs. The concept of a postclypeus in the Saldidae is questioned and the term *transverse swelling*, as coined by Parsons, is applied in discussing distinctive aspects of facial morphology in *Pseudosaldula*. A previously unreported, presumably glandular, pore is documented on the parameres in the Saldinae in the form of a cavernous pit with internal digitiform processes.

A phylogenetic analysis based on morphological character data documents the monophyly of *Pseudosaldula*. Characters treated as synapomorphic for *Pseudosaldula* are five cells in the membrane of the forewing, the incomplete connection of the transverse swelling across the posterior margin of the clypeus, and the straight connection across the posterior margin of the parandria; nymphal coloration is also distinctive, although treated as ambiguous because this character was not scored for all species. DNA sequence data from the 16S rDNA region of the mitochondrion and H3 nuclear region were acquired for 13 *Pseudosaldula* spp. and five outgroup taxa. The combined analysis of morphological and sequence data consistently treated *Pseudosaldula* as paraphyletic. These results are interpreted as the result of inadequate sampling of both taxa and gene regions, in light of the fact that the patterns of distribution become transpacific, as opposed to a monophyletic group in the Andean Region. Not unexpectedly, several morphological characters documenting the monophyly of *Pseudosaldula* show greater homoplasy in the combined analysis than when analyzing morphological data alone. Therefore, the results of the morphological cladistic analysis are further used to examine distributional patterns in the group. Five areas of endemism are recognized: northern Andes, northern Peru, Puna, central Chile, and subantarctic; the boundaries of these areas show substantial correspondence with those proposed for other groups of insects.

INTRODUCTION

The Saldidae is a worldwide group of about 335 species that shows its greatest diversity in the Northern Hemisphere (Schuh et al., 1987). The morphological body plan within the Saldidae shows only limited variation across the group, whereas within-species morphological variation can be extreme. All species of Saldidae are predatory and live on damp substrates. Species in a number of phyletic lineages—including other members of the Leptopodomorpha—are capable of withstanding prolonged submersion, several of those in intertidal environments. These include several species of *Saldula* Van Duzee, such as *S. laticollis* (Reuter) (Bahr and Schulte, 1976), all species of *Salduncula* Brown (Brown, 1959), the truly intertidal *Aepophilus bonnaerei* Signoret from western Europe, placed in the family Aepophilidae (King and Ratcliffe, 1970; Schuh and Polhemus, 1980), and all members of the family Omaniidae from the tropical Indo-Pacific (Cobben, 1970).

The taxonomic history of the shore bugs is complex and the features used to diagnose genera and suprageneric assemblages have frequently not allowed for the recognition of monophyletic groupings. The details of morphology in the Saldidae—and Leptopodomorpha more broadly—were treated in a largely superficial manner until the appearance of works by the late René Cobben beginning in 1957; we make further mention of Cobben's relevant works below and provide citations to them.

The first descriptive work on the Saldidae of South America dates from Blanchard (1852). Efforts to describe the fauna were decidedly piecemeal until Carl J. Drake took up work on the Saldidae in the late 1940s (Drake and Carvalho, 1948; Drake, 1949). Many of the available names for the Saldidae in South America, and the majority of those now placed in *Pseudosaldula* Cobben, were proposed by Drake and his co-authors. Drake took at least one field trip to Argentina in the 1920s—on which he collected some specimens of Saldidae—and this may have been part of his inspiration to study the fauna of the region.

The existing taxonomic literature on the Saldidae of South America remains of limited extent and use for taxonomic identification and understanding of diversity, distributions, and relationships. This situation results from the fact that most published descriptions were based on one or a few specimens and took little or no account of infraspecific variation. The limitations of the literature become particularly evident when one examines the synonymies associated with the diagnoses and descriptions provided in the present paper.

The genus *Pseudosaldula*, the focus of the present paper, comprises at least 25% of the species of Saldidae from South America. Although much of its distribution lies within the tropical latitudes, its restriction to relatively high elevations and high latitudes at lower elevations, gives it an effectively temperate-latitude distribution, like so many other members of the family.

The current study was undertaken in an effort to rectify the shortcomings in the existing literature on *Pseudosaldula*, while at the same time bringing to light information on a large amount of material collected mostly by the authors over the last four decades. The first fieldwork incorporated into this project was conducted by R.T. Schuh and Janet Crane in Peru during 1971–72, at which time a limited number of Saldidae were collected. Additional collecting was undertaken by R.T. Schuh in Colombia, Ecuador, and Peru during 1976 and in Bolivia, Colombia, and Peru by J.T. and D.A. Polhemus during 1989. The southern Andes of Chile and Argentina were surveyed on field trips by R.T. Schuh during 1981–82, and 1986, by R.T. Schuh and J.T. Polhemus during 1993, and by S. Oygur and E. Barrera in 1994.

Materials and Methods

During the course of this research project, matrix code labels were affixed to the more than 3500 specimens examined as a way to uniquely identify them; these codes are therefore referred to as "unique specimen identifiers" (USIs). The USI codes, e.g., AMNH_ENT 00021550, are composed of an institution and project code (AMNH_ENT) and a unique number (00021550). USI codes are included in the locality data and are used to identify specimens from which illustrations were made.

We have listed verbatim label data for the holotypes associated with all previously available names. Most of these historical specimens are also listed under Specimens Examined as a way of showing the political subdivisions and latitude-longitude coordinates we have associated with them. In a few cases we were unable to place the type locality with precision and it is therefore not georeferenced and not included under Specimens Examined.

All latitude-longitude data presented in the Specimens Examined section of the paper are in degrees and decimal parts thereof. Most coordinates were determined through the use of gazetteers, although some were acquired directly in the field through the use of a GPS device. Altitude data are treated as metric. Please refer to the *www.discoverlife.org* website as a way of accessing additional information on specimens examined and for access to interactive mapping tools.

Color digital images of the bugs were prepared using a Microptics-USA photomicrographic apparatus using a Nikon SLR digital camera, Infinity optics, and a Microptics-USA ML 1000 light source, all supplied by Roy Larimer. Habitus photos are proportional to the size of the actual specimens so that relative dimensions can be deduced from comparison of the specimen images. Actual sizes of specimens can be determined by referring to table 1. Legs were removed from all imaged specimens through digital editing, because they were only partially visible, provided no additional information, and detracted from the informative aspects of coloration, vestiture, and texture of the dorsum. Zeiss EVO and Hitachi 4700 scan-

TABLE 1
Measurements of 14 *Pseudosaldula* spp.

Pseudosaldula		Length					Width			Inter-Ocular				
		Body	Head	Pronotum	Mesoscutum	Scutellum	Head	Pronotum	Scutellum	Distance	AntSeg1	AntSeg2	AntSeg3	AntSeg4
P. andensis														
M (N = 9)	**Mean**	**3.57**	**0.54**	**0.52**	**0.29**	**0.46**	**1.10**	**1.29**	**0.77**	**0.35**	**0.30**	**0.68**	**0.48**	**0.55**
	SD	0.22	0.04	0.04	0.06	0.04	0.06	0.08	0.09	0.03	0.03	0.08	0.04	0.02
	Range	0.63	0.12	0.12	0.16	0.10	0.15	0.22	0.27	0.09	0.08	0.23	0.14	0.07
	Min	3.34	0.46	0.47	0.20	0.41	1.03	1.19	0.67	0.29	0.25	0.61	0.42	0.52
	Max	3.97	0.58	0.59	0.36	0.50	1.18	1.40	0.94	0.39	0.34	0.84	0.56	0.59
F (N = 8)	**Mean**	**4.21**	**0.64**	**0.59**	**0.36**	**0.56**	**1.19**	**1.52**	**0.89**	**0.43**	**0.32**	**0.77**	**0.52**	**0.58**
	SD	0.48	0.05	0.03	0.08	0.07	0.06	0.14	0.14	0.03	0.02	0.08	0.04	0.03
	Range	1.53	0.13	0.09	0.26	0.22	0.15	0.45	0.45	0.09	0.07	0.21	0.13	0.09
	Min	3.62	0.57	0.54	0.26	0.47	1.10	1.33	0.73	0.39	0.29	0.66	0.45	0.53
	Max	5.15	0.69	0.63	0.52	0.69	1.25	1.78	1.18	0.47	0.36	0.88	0.57	0.63
P. antioquia														
M (N = 3)	**Mean**	**2.95**	**0.56**	**0.38**	**0.29**	**0.38**	**0.95**	**1.07**	**0.67**	**0.31**	**0.24**	**0.63**	**0.46**	**0.52**
	SD	0.15	0.03	0.01	0.01	0.02	0.04	0.05	0.03	0.01	0.01	0.02	0.03	0.02
	Range	0.30	0.07	0.02	0.02	0.03	0.07	0.09	0.05	0.03	0.02	0.05	0.07	0.03
	Min	2.82	0.53	0.37	0.28	0.36	0.93	1.03	0.64	0.30	0.24	0.61	0.43	0.50
	Max	3.12	0.59	0.39	0.30	0.39	1.00	1.12	0.69	0.33	0.25	0.65	0.49	0.54
F (N = 2)	**Mean**	**3.13**	**0.54**	**0.43**	**0.29**	**0.44**	**1.00**	**1.15**	**0.75**	**0.35**	**0.26**	**0.67**	**0.44**	**0.49**
	SD	0.17	0.00	0.03	0.02	0.03	0.01	0.05	0.04	0.05	0.01	0.05	0.01	0.02
	Range	0.25	0.00	0.04	0.02	0.04	0.01	0.06	0.05	0.07	0.02	0.07	0.02	0.03
	Min	3.01	0.54	0.41	0.28	0.42	0.99	1.11	0.72	0.31	0.25	0.64	0.43	0.47
	Max	3.26	0.55	0.45	0.30	0.46	1.00	1.18	0.77	0.38	0.27	0.71	0.45	0.50
P. aurea														
M (N = 4)	**Mean**	**3.37**	**0.58**	**0.50**	**0.31**	**0.49**	**1.04**	**1.32**	**0.81**	**0.38**	**0.28**	**0.66**	**0.47**	**0.53**
	SD	0.11	0.02	0.04	0.02	0.03	0.01	0.03	0.04	0.02	0.04	0.04	0.03	0.02
	Range	0.23	0.05	0.08	0.04	0.06	0.03	0.06	0.09	0.05	0.09	0.09	0.07	0.03
	Min	3.23	0.55	0.45	0.29	0.46	1.03	1.29	0.75	0.36	0.23	0.61	0.44	0.51
	Max	3.46	0.61	0.54	0.33	0.52	1.05	1.35	0.84	0.41	0.31	0.71	0.52	0.54
F (N = 2)	**Mean**	**3.72**	**0.60**	**0.57**	**0.31**	**0.57**	**1.09**	**1.47**	**0.86**	**0.43**	**0.26**	**0.64**	**0.45**	**0.53**
	SD	0.26	0.03	0.02	0.01	0.04	0.05	0.09	0.06	0.01	0.01	0.10	0.05	0.03
	Range	0.37	0.04	0.04	0.01	0.05	0.06	0.13	0.09	0.01	0.01	0.14	0.07	0.04
	Min	3.53	0.58	0.55	0.30	0.54	1.06	1.41	0.82	0.43	0.26	0.57	0.41	0.51
	Max	3.91	0.62	0.59	0.31	0.59	1.12	1.54	0.90	0.44	0.27	0.71	0.48	0.55

TABLE 1
(Continued)

Pseudosaldula		Length: Body	Length: Head	Length: Pronotum	Length: Mesoscutum	Length: Scutellum	Width: Head	Width: Pronotum	Width: Scutellum	Inter-Ocular Distance	AntSeg1	AntSeg2	AntSeg3	AntSeg4
P. bergi														
M (N = 11)	**Mean**	**3.69**	**0.59**	**0.52**	**0.35**	**0.64**	**1.04**	**1.35**	**0.77**	**0.46**	**0.31**	**0.66**	**0.48**	**0.55**
	SD	0.47	0.07	0.05	0.23	0.34	0.09	0.17	0.20	0.17	0.04	0.09	0.04	0.03
	Range	1.76	0.22	0.16	0.82	1.26	0.35	0.61	0.67	0.59	0.15	0.26	0.15	0.08
	Min	2.53	0.48	0.41	0.24	0.40	1.01	1.24	0.73	0.37	0.27	0.52	0.41	0.52
	Max	4.29	0.70	0.57	1.02	1.66	1.14	1.53	0.86	0.96	0.38	0.78	0.55	0.60
F (N = 9)	**Mean**	**4.22**	**0.66**	**0.55**	**0.34**	**0.63**	**1.14**	**1.58**	**0.97**	**0.46**	**0.34**	**0.75**	**0.50**	**0.58**
	SD	0.39	0.05	0.07	0.04	0.09	0.09	0.14	0.08	0.05	0.05	0.12	0.05	0.04
	Range	1.11	0.13	0.20	0.12	0.23	0.22	0.38	0.24	0.12	0.13	0.34	0.16	0.11
	Min	3.71	0.59	0.44	0.28	0.48	1.03	1.37	0.83	0.40	0.28	0.60	0.45	0.54
	Max	4.82	0.72	0.64	0.40	0.72	1.25	1.74	1.08	0.52	0.41	0.94	0.61	0.64
P. bruesi														
M (N = 5)	**Mean**	**3.71**	**0.53**	**0.53**	**0.29**	**0.54**	**1.05**	**1.38**	**0.81**	**0.39**	**0.29**	**0.63**	**0.46**	**0.53**
	SD	0.16	0.06	0.02	0.06	0.05	0.03	0.08	0.08	0.01	0.01	0.01	0.02	0.02
	Range	0.32	0.15	0.05	0.15	0.11	0.08	0.16	0.20	0.03	0.02	0.04	0.06	0.05
	Min	3.56	0.46	0.49	0.23	0.47	0.99	1.29	0.73	0.38	0.28	0.61	0.42	0.49
	Max	3.88	0.61	0.54	0.38	0.59	1.07	1.45	0.93	0.41	0.30	0.65	0.48	0.54
F (N = 8)	**Mean**	**3.97**	**0.60**	**0.56**	**0.33**	**0.57**	**1.12**	**1.46**	**0.90**	**0.44**	**0.30**	**0.69**	**0.47**	**0.57**
	SD	0.26	0.03	0.04	0.02	0.07	0.05	0.08	0.05	0.03	0.02	0.08	0.04	0.07
	Range	0.77	0.12	0.10	0.07	0.21	0.12	0.27	0.15	0.07	0.08	0.23	0.10	0.20
	Min	3.70	0.54	0.53	0.29	0.46	1.08	1.36	0.85	0.41	0.28	0.64	0.43	0.49
	Max	4.47	0.66	0.63	0.36	0.66	1.19	1.63	1.00	0.48	0.36	0.87	0.53	0.69
P. chilensis														
M (N = 14)	**Mean**	**3.50**	**0.51**	**0.45**	**0.31**	**0.50**	**0.97**	**1.33**	**0.83**	**0.37**	**0.27**	**0.57**	**0.41**	**0.48**
	SD	0.28	0.05	0.04	0.04	0.05	0.03	0.07	0.07	0.02	0.04	0.05	0.03	0.02
	Range	0.93	0.23	0.11	0.13	0.15	0.10	0.22	0.23	0.08	0.13	0.18	0.09	0.06
	Min	3.06	0.37	0.38	0.25	0.43	0.92	1.22	0.72	0.34	0.21	0.50	0.36	0.45
	Max	3.99	0.60	0.50	0.38	0.57	1.02	1.44	0.95	0.42	0.34	0.68	0.45	0.51
F (N = 14)	**Mean**	**4.11**	**0.57**	**0.51**	**0.38**	**0.59**	**1.08**	**1.57**	**0.96**	**0.46**	**0.31**	**0.64**	**0.44**	**0.50**
	SD	0.28	0.09	0.04	0.06	0.06	0.15	0.10	0.24	0.09	0.03	0.06	0.03	0.04
	Range	0.98	0.26	0.15	0.20	0.21	0.61	0.38	0.96	0.30	0.12	0.22	0.10	0.13
	Min	3.61	0.46	0.43	0.28	0.45	0.99	1.37	0.23	0.38	0.25	0.55	0.40	0.45
	Max	4.59	0.72	0.58	0.48	0.67	1.60	1.76	1.18	0.69	0.37	0.76	0.50	0.58

TABLE 1
(Continued)

		Length					Width			Inter-Ocular				
Pseudosaldula		Body	Head	Pronotum	Mesoscutum	Scutellum	Head	Pronotum	Scutellum	Distance	AntSeg1	AntSeg2	AntSeg3	AntSeg4
P. huamachuco														
M (N = 6)	**Mean**	**2.71**	**0.47**	**0.39**	**0.23**	**0.33**	**0.77**	**0.99**	**0.59**	**0.32**	**0.20**	**0.38**	**0.29**	**0.38**
	SD	0.08	0.03	0.02	0.10	0.01	0.03	0.05	0.03	0.01	0.01	0.02	0.02	0.02
	Range	0.21	0.07	0.05	0.29	0.03	0.08	0.12	0.08	0.03	0.03	0.05	0.06	0.04
	Min	2.61	0.43	0.37	0.11	0.31	0.74	0.94	0.55	0.30	0.18	0.36	0.25	0.35
	Max	2.82	0.50	0.42	0.41	0.34	0.82	1.06	0.63	0.33	0.21	0.41	0.31	0.39
F (N = 6)	**Mean**	**2.82**	**0.47**	**0.39**	**0.19**	**0.40**	**0.79**	**1.07**	**0.69**	**0.36**	**0.20**	**0.40**	**0.29**	**0.39**
	SD	0.09	0.05	0.05	0.02	0.03	0.03	0.07	0.04	0.02	0.01	0.03	0.02	0.03
	Range	0.20	0.12	0.13	0.06	0.08	0.09	0.17	0.09	0.07	0.02	0.08	0.05	0.07
	Min	2.73	0.42	0.30	0.16	0.35	0.73	0.96	0.63	0.32	0.19	0.35	0.27	0.36
	Max	2.93	0.54	0.44	0.23	0.42	0.82	1.13	0.72	0.39	0.21	0.43	0.32	0.43
P. penai														
M (N = 5)	**Mean**	**3.18**	**0.44**	**0.45**	**0.30**	**0.43**	**0.92**	**1.28**	**0.82**	**0.37**	**0.25**	**0.49**	**0.35**	**0.44**
	SD	0.34	0.08	0.05	0.03	0.08	0.05	0.14	0.12	0.02	0.02	0.04	0.01	0.03
	Range	0.79	0.18	0.12	0.08	0.20	0.10	0.32	0.26	0.04	0.04	0.08	0.02	0.08
	Min	2.80	0.35	0.38	0.26	0.35	0.88	1.11	0.67	0.36	0.22	0.45	0.34	0.40
	Max	3.59	0.53	0.50	0.34	0.54	0.98	1.43	0.93	0.39	0.27	0.53	0.36	0.48
F (N = 5)	**Mean**	**3.27**	**0.49**	**0.45**	**0.29**	**0.42**	**0.94**	**1.30**	**0.77**	**0.39**	**0.25**	**0.48**	**0.37**	**0.44**
	SD	0.17	0.04	0.03	0.03	0.05	0.04	0.08	0.06	0.01	0.03	0.02	0.02	0.02
	Range	0.49	0.10	0.06	0.09	0.15	0.10	0.19	0.14	0.03	0.07	0.05	0.07	0.05
	Min	3.03	0.45	0.43	0.26	0.34	0.89	1.23	0.73	0.37	0.20	0.47	0.33	0.41
	Max	3.51	0.55	0.49	0.34	0.49	0.99	1.42	0.86	0.40	0.28	0.51	0.40	0.46
P. perula														
M (N = 4)	**Mean**	**2.90**	**0.50**	**0.42**	**0.24**	**0.39**	**0.88**	**1.10**	**0.65**	**0.35**	**0.23**	**0.48**	**0.37**	**0.47**
	SD	0.06	0.04	0.03	0.02	0.01	0.02	0.02	0.01	0.01	0.03	0.03	0.02	0.02
	Range	0.14	0.08	0.06	0.05	0.03	0.04	0.04	0.02	0.02	0.06	0.06	0.06	0.04
	Min	2.83	0.47	0.40	0.23	0.37	0.87	1.08	0.64	0.34	0.19	0.46	0.34	0.45
	Max	2.96	0.56	0.46	0.27	0.40	0.91	1.12	0.66	0.36	0.26	0.52	0.40	0.50
F (N = 3)	**Mean**	**3.64**	**0.53**	**0.48**	**0.37**	**0.54**	**0.97**	**1.40**	**0.90**	**0.41**	**0.26**	**0.57**	**0.42**	**0.48**
	SD	0.39	0.01	0.02	0.04	0.06	0.02	0.13	0.14	0.01	0.04	0.03	0.02	0.01
	Range	0.70	0.01	0.04	0.07	0.13	0.04	0.24	0.25	0.01	0.08	0.06	0.03	0.02
	Min	3.19	0.52	0.47	0.33	0.47	0.94	1.25	0.74	0.40	0.21	0.54	0.40	0.48
	Max	3.89	0.54	0.51	0.40	0.60	0.99	1.50	0.99	0.41	0.29	0.60	0.43	0.50

TABLE 1
(Continued)

		Length					Width			Inter-Ocular				
Pseudosaldula		Body	Head	Pronotum	Mesoscutum	Scutellum	Head	Pronotum	Scutellum	Distance	AntSeg1	AntSeg2	AntSeg3	AntSeg4
P. pilosa														
M (N = 7)	**Mean**	**3.23**	**0.54**	**0.45**	**0.27**	**0.45**	**0.97**	**1.19**	**0.72**	**0.37**	**0.28**	**0.56**	**0.43**	**0.52**
	SD	0.17	0.04	0.03	0.06	0.02	0.02	0.06	0.05	0.02	0.02	0.04	0.03	0.02
	Range	0.46	0.12	0.08	0.19	0.06	0.07	0.14	0.13	0.05	0.04	0.10	0.07	0.04
	Min	3.04	0.45	0.42	0.17	0.41	0.93	1.13	0.67	0.35	0.26	0.53	0.40	0.50
	Max	3.50	0.58	0.50	0.36	0.48	1.00	1.26	0.80	0.40	0.30	0.62	0.47	0.54
F (N = 11)	**Mean**	**3.53**	**0.61**	**0.49**	**0.29**	**0.52**	**1.08**	**1.34**	**0.76**	**0.43**	**0.28**	**0.60**	**0.43**	**0.53**
	SD	0.25	0.05	0.04	0.06	0.05	0.19	0.09	0.25	0.09	0.04	0.05	0.03	0.03
	Range	0.72	0.15	0.15	0.22	0.16	0.68	0.28	0.93	0.33	0.10	0.15	0.09	0.11
	Min	3.16	0.56	0.45	0.22	0.47	0.95	1.19	0.06	0.37	0.23	0.53	0.40	0.49
	Max	3.88	0.70	0.59	0.42	0.63	1.63	1.47	0.99	0.70	0.33	0.68	0.48	0.59
P. salina														
M (N = 5)	**Mean**	**3.52**	**0.54**	**0.41**	**0.33**	**0.40**	**0.89**	**1.24**	**0.81**	**0.34**	**0.29**	**0.59**	**0.38**	**0.41**
	SD	0.19	0.06	0.03	0.05	0.07	0.03	0.06	0.06	0.03	0.01	0.03	0.01	0.01
	Range	0.52	0.15	0.06	0.12	0.17	0.08	0.16	0.13	0.07	0.03	0.10	0.03	0.02
	Min	3.24	0.45	0.38	0.27	0.28	0.85	1.18	0.75	0.32	0.28	0.54	0.37	0.40
	Max	3.76	0.60	0.44	0.38	0.45	0.93	1.34	0.88	0.39	0.30	0.64	0.40	0.42
F (N = 2)	**Mean**	**3.39**	**0.56**	**0.38**	**0.30**	**0.41**	**0.85**	**1.16**	**0.79**	**0.32**	**0.24**	**0.60**	**0.40**	**0.43**
	SD	0.23	0.06	0.04	0.02	0.01	0.01	0.11	0.06	0.02	0.02	0.05	0.01	0.00
	Range	0.33	0.08	0.06	0.02	0.01	0.02	0.15	0.08	0.03	0.03	0.06	0.02	0.00
	Min	3.22	0.51	0.35	0.29	0.41	0.84	1.09	0.75	0.30	0.23	0.57	0.39	0.43
	Max	3.55	0.60	0.41	0.32	0.42	0.85	1.24	0.83	0.33	0.25	0.63	0.41	0.43
P. saxicola														
M (N = 14)	**Mean**	**3.81**	**0.58**	**0.50**	**0.36**	**0.49**	**1.07**	**1.32**	**0.86**	**0.42**	**0.31**	**0.85**	**0.57**	**0.57**
	SD	0.28	0.06	0.03	0.05	0.07	0.04	0.12	0.09	0.03	0.03	0.05	0.03	0.02
	Range	0.92	0.21	0.08	0.19	0.29	0.17	0.39	0.31	0.10	0.12	0.15	0.08	0.05
	Min	3.47	0.49	0.47	0.28	0.32	1.00	1.16	0.74	0.39	0.26	0.76	0.53	0.54
	Max	4.39	0.70	0.55	0.47	0.61	1.17	1.55	1.05	0.49	0.37	0.91	0.61	0.59
F (N = 8)	**Mean**	**4.23**	**0.68**	**0.53**	**0.38**	**0.56**	**1.10**	**1.47**	**0.94**	**0.46**	**0.34**	**0.88**	**0.57**	**0.56**
	SD	0.37	0.07	0.07	0.07	0.04	0.05	0.13	0.11	0.02	0.04	0.05	0.04	0.07
	Range	1.02	0.22	0.18	0.21	0.13	0.11	0.36	0.32	0.06	0.12	0.15	0.12	0.24
	Min	3.66	0.56	0.43	0.26	0.49	1.04	1.29	0.76	0.43	0.29	0.78	0.50	0.40
	Max	4.68	0.78	0.61	0.47	0.62	1.15	1.66	1.08	0.49	0.41	0.93	0.62	0.64

TABLE 1
(Continued)

		Length					Width			Inter-Ocular				
Pseudosaldula		Body	Head	Pronotum	Mesoscutum	Scutellum	Head	Pronotum	Scutellum	Distance	AntSeg1	AntSeg2	AntSeg3	AntSeg4
P. vulgaris														
M (N = 15)	**Mean**	**3.25**	**0.51**	**0.46**	**0.26**	**0.45**	**0.93**	**1.26**	**0.78**	**0.38**	**0.25**	**0.52**	**0.39**	**0.46**
	SD	0.36	0.08	0.04	0.06	0.07	0.05	0.15	0.13	0.03	0.02	0.05	0.03	0.04
	Range	1.01	0.27	0.16	0.20	0.23	0.19	0.45	0.35	0.12	0.08	0.16	0.10	0.13
	Min	2.80	0.35	0.38	0.15	0.35	0.84	1.05	0.61	0.34	0.21	0.45	0.34	0.40
	Max	3.81	0.62	0.54	0.36	0.58	1.03	1.51	0.96	0.46	0.29	0.61	0.44	0.53
F (N = 13)	**Mean**	**3.43**	**0.55**	**0.48**	**0.29**	**0.47**	**0.95**	**1.32**	**0.81**	**0.40**	**0.26**	**0.54**	**0.40**	**0.47**
	SD	0.26	0.06	0.03	0.06	0.07	0.04	0.09	0.08	0.02	0.02	0.05	0.04	0.04
	Range	0.96	0.22	0.11	0.29	0.27	0.14	0.34	0.32	0.06	0.11	0.16	0.13	0.13
	Min	2.97	0.45	0.43	0.18	0.34	0.86	1.13	0.66	0.37	0.20	0.47	0.33	0.41
	Max	3.93	0.67	0.53	0.47	0.60	1.00	1.47	0.98	0.43	0.31	0.63	0.46	0.54
P. yungas														
M (N = 2)	**Mean**	**4.31**	**0.68**	**0.53**	**0.36**	**0.51**	**1.18**	**1.43**	**0.94**	**0.45**	**0.32**	**0.88**	**0.67**	**0.62**
	SD	0.43	0.08	0.08	0.10	0.08	0.07	0.16	0.14	0.07	0.02	0.14		
	Range	0.60	0.11	0.11	0.14	0.12	0.11	0.23	0.19	0.10	0.02	0.20		
	Min	4.01	0.62	0.48	0.29	0.45	1.13	1.32	0.84	0.40	0.31	0.78	0.67	0.62
	Max	4.61	0.73	0.59	0.43	0.57	1.23	1.54	1.03	0.50	0.33	0.98	0.67	0.62
F (N = 2)	**Mean**	**4.69**	**0.65**	**0.60**	**0.47**	**0.65**	**1.22**	**1.59**	**1.10**	**0.50**	**0.40**	**1.00**	**0.65**	**0.64**
	SD	0.40	0.10	0.04	0.07	0.07	0.03	0.11	0.09	0.01	0.02	0.03	0.03	0.03
	Range	0.88	0.24	0.08	0.14	0.16	0.08	0.25	0.19	0.02	0.03	0.07	0.06	0.06
	Min	4.14	0.53	0.56	0.37	0.56	1.18	1.43	0.98	0.49	0.38	0.97	0.61	0.61
	Max	5.02	0.78	0.64	0.51	0.73	1.26	1.68	1.18	0.51	0.41	1.04	0.68	0.67

ning electron microscopes were used to prepare the scanning micrographs; specimens were coated with gold/palladium before examination.

Line drawings of the parameres shown in figures 2 and 3 are partially schematized because the central area of the paramere in most species is so intensely black that it is often impossible to discern the placement and number of setae on the dorsal and ventral surfaces of the paramere. These drawings are therefore meant to be used in conjunction with the scanning electron micrographs presented for a majority of the species.

Illustrations include arrows designed to reveal three types of information: (1) white arrows used in conjunction with lettered abbreviations identify structural conditions (e.g., glp, mp); (2) black arrows with numbers indicate characters synapomorphic for *Pseudosaldula*; (3) white arrows with numbers indicate characters/character states supporting the recognition of species and species groups.

Maps were produced using a version of the ArcInfo geographic information system software. Maps showing the tropical latitudes use the WGS 1984 spatial reference. Maps for higher latitudes use the Lambert Conformal Conic Projection.

Most species of *Pseudosaldula* show some degree of wing reduction in the adult. We employ the term *macropterous* for those specimens in which the wings are fully developed and the insects are capable of flight. We use *submacropterous* for those specimens that show modest shortening of the forewings, but which show no strong modification or loss of cells in the membrane; we presume that these specimens are capable of flight. We use the term *brachypterous* for specimens that show significant shortening of the wing with a concomitant modification or loss of cells in the membrane; these specimens are not capable of flight.

All measurements are in millimeters and were made using a micrometer-driven stage, and output written directly to a spreadsheet.

Institutional abbreviations used in the specimen-examined sections are indicated below, along with the names of the institutions and individuals who loaned specimens studied during the course of this project.

AMNH	American Museum of Natural History, New York
BMNH	The Natural History Museum, London, Mick Webb
EELM	Universidad Agraria La Molina, Lima, Peru
JTPC	J.T. Polhemus Collection, Englewood, Colorado
SEMC	Snow Entomological Museum, University of Kansas, Lawrence, George W. Byers
MACN	Museo Argentino de Ciencias Naturales, Buenos Aires, Axel Bachmann
MLPA	Museo de la Plata, La Plata, Argentina, Ricardo Ronderos
MNHN	Museum National d'Histoire Naturelle, Paris, Dominique Pluot-Sigwald
MNNC	Museo Nacional de History Natural, Santiago, Chile, Mario Elgueta
IMLA	Instituto Miguel Lillo, Tucumán, Argentina, Arturo Teran, Maria de Toledo, and the late A. Willink
USNM	National Museum of Natural History, Smithsonian Institution, Washington, DC, the late Richard C. Froeschner

Pseudosaldula Cobben

Pseudosaldula Cobben, 1961: 96 (n. gen.) – Polhemus, 1976: 235 (n. syn.). – Polhemus, 1985: 104 (phylogenetic placement). – Schuh et al., 1987: 314 (cat.).
Oreokora Drake, 1962: 119 (n. gen.).

TYPE SPECIES: *Acanthia rogeri* Kirkaldy, 1899 (a junior synonym of *Acanthia chilensis* Blanchard, 1852).

DIAGNOSIS: Five cells in forewing membrane, the lateralmost cell (5) always smaller than the other four and located in the laterobasal angle of cell 4; postclypeal swelling not extending across posterior (dorsal) margin of clypeus (pl. 6, pc; see also generic discussion), lateral margins of pronotum usually with a contrasting pale stripe; hemelytron often with pruinose markings; often brachypterous with forewing membrane reduced, cells variously reduced or eliminated, and with hind wings reduced to small stubs; surface of pronotum and scutellum ranging from smooth to rugose, strongly to moderately shining; area of overlap along claval commissure narrowly to rather broadly polished and shining. Distinguished from most other members of the Saldinae by the transverse swelling discontinuous across the base of the clypeus and not forming a postclypeus sensu Cobben and the presence of 5 cells in the membrane in all macropterous forms, except for the recently described *Sinosalda* Vinokurov from China, also with 5 cells in the membrane, and also lacking the connection of the transverse swelling across the base of the clypeus, but *Sinosalda* with cell 5 more elongate than in any *Pseudosaldula* species and more rectangular in form; *Sinosalda* also with very long, slender antennae. Distinguished from members of the Chiloxanthinae (with 4 or 5 cells in the membrane) by *Pseudosaldula* having the parandria with a curvilinear inner margin and a medial membrane (figs. 1, 17D) as well as the short peglike setae on the male abdominal grasping apparatus (fig. 19F, G), whereas the Chiloxanthinae with the inner parandrial margins parallel (fig. 22D), separated, and lacking a medial membranous area and by the elongate slender setae on the male abdominal grasping apparatus (fig. 22B, C).

REDESCRIPTION: *Male*: Total length 2.61–4.61, width pronotum 0.94–1.54. COLORATION (pls. 1–6): Head in dorsal view, pronotum, scutellum, and most of adjacent clavus entirely black or nearly so; lateral margin of pronotum usually with a pale stripe over most of length on dorsal and ventral surfaces (occasionally reduced on dorsal surface); mandibular plates, clypeus, labrum, preocellar spot, and base of elongate, median, cephalic trichobothrium-like seta yellow, contrasting with black frons; preocellar spot usually triangular, nearly twice as long as wide and at least twice as long as diameter of ocellus, the short leg of the triangle on the posterior edge of the spot, occasionally spot round, about same diameter as ocellus; labium mostly yellow with some infuscation; compound eyes ranging from near white to nearly black; forewings ranging from almost entirely dark to largely pale, except for basalmost area of corium and most of clavus; specimens with extensive dark pigmentation in forewings frequently with some pale or yellowish areas and also frequently with areas of pruinosity; antennal coloration ranging from entirely dark to largely pale; femora ranging from largely pale to partially brown, tibiae usually pale, sometimes with a dark stripe on anterior (dorsal) surface; thoracic and abdominal venter black. SURFACE AND VESTITURE (figs. 4, 5D): Dorsal surface of head, pronotum, mesoscutum, and scutellum and entire venter polished, usually strongly shining. Dorsum, especially corium and clavus, with black setae ranging from short and recumbent to long and erect and often also with short, golden, shining setae; venter with short, reclining, simple setae. Antennae with short reclining setae and a few erect dark setae of length greater than segmental diameter; all tibiae with reclining pale setae and some heavy black spines, foretibiae with a few spines on ventral surface, middle tibiae with ~8 spines more widely distributed, hind tibiae with >10 generally distributed spines. Head with three pairs of long, erect cephalic setae, more or less evenly spaced between dorsal margin of mandibular plate and ocellus; an additional pair of long setae each on clypeus and labrum. STRUCTURE: Elongate ovoid to broadly ovoid in macropterous forms, frequently brachypterous, teardrop shaped, and broadest in area of costal fracture. **Head** (fig. 6): Transverse swelling of face conspicuous laterally not extending across base of clypeus to form postclypeus *sensu* Cobben. **Thorax** (figs. 4, 5C, 16): Pronotum trapezoidal, lateral margins ranging from weakly concave to weakly convex, in most strongly concave forms overall pronotal shape campanulate with more strongly elevated posterior lobe; posterior margin moderately to strongly excavated across mesoscutum, macropterous forms showing stronger excavation; mesoscutum moderately to broadly exposed, in macropterous forms nearly as long on midline as scutellum. *Hemelytra* (pls. 1–5; figs. 4, 16: Forewings ranging from fully developed to strongly brachypterous; membrane always with five cells in macropterous forms, cell 5 always smaller than the other four and located in the laterobasal angle of cell 4;

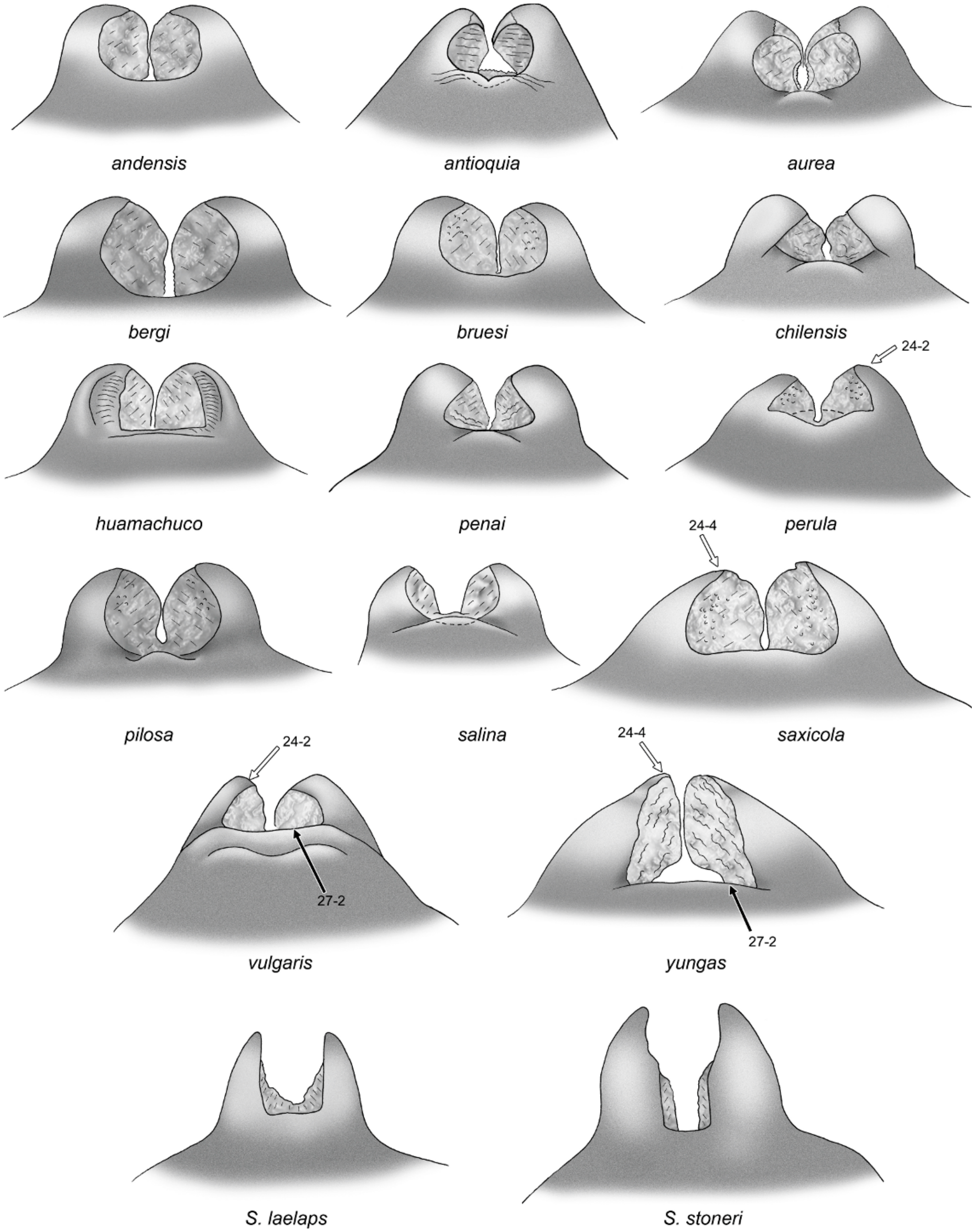


Fig. 1. Parandria of 14 *Pseudosaldula* spp. and two *Saldula* spp.

membrane weakly to strongly reduced in brachypterous forms, cells frequently reduced in length, coalesced, or lost. *Hind Wings*: Reduced to flaplike remnants in most brachypterous forms. *Legs* (fig. 11): Structurally typical of Saldinae, as in figure 10; pretarsus of foreleg lacking a dorsal arolium, pretarsus of middle and hind legs with a dorsal arolium. **Abdomen** (fig. 11D–G): Typical of Saldinae, abdominal grasping apparatus with short, stout, peglike setae (fig. 11F, G). GENITALIA: **Pygophore** (fig. 11E): Parandria usually with apex of projections broadly rounded, medial membrane covering all or most of medial margin of projections, medial margin angulate, more broadly separated proximally than apically, and posterior margin nearly straight and relatively long. **Parameres** (figs. 2, 3, 6A, B): Posterior (ventral) face of paramere with a distinct indentation just basad of processus sensualis (fig. 2A), forming a distinct line of demarcation on face of paramere (figs. 1, 2, 9G, H); area distad of line smooth and devoid of setae (figs. 9G, H, 12B), as in *Saldula* Van Duzee; processus sensualis not elevated, bearing a few (10–15) to many (~40) setae; apex of paramere with from 5–20 short setiform sensors (sensilla), mostly on the ventral face. **Aedeagus**: Penisfilum typical of Saldinae with 1.5–2.0 coils (see Cobben, 1957: fig. 16, 1961: fig. 9).

Female (pls. 1–6): Structure and coloration similar to male; usually larger and slightly more broad bodied. **Abdomen**: Subgenital plate entire and smoothly rounded across posterior margin. Ovipositor serrate.

Nymph: COLORATION: Dorsum red-brown to castaneous; lateral margins of pronotum and wing pads generally pale; abdominal segments 5 and or 6 sometimes with quadrate pale marking on lateral margin; anterior tergites sometimes partially pale, rarely including area of scent-gland opening; appendages pale to red-brown. VESTITURE: Setae on dorsum virtually absent, short, or long and suberect to erect. STRUCTURE: Dorsal abdominal gland opening present between terga 3 and 4.

DISCUSSION: *Membrane Venation*: Traditionally, most species of Saldidae with five cells in the forewing membrane were placed in the genus *Pentacora* Reuter. Cobben (1959) proposed a revised classification of the Saldidae, in which subfamily divisions were heavily based on male and female genitalic structure, although he indicated that five cells in the membrane was a diagnostic feature of the subfamily Chiloxanthinae, whereas the Saldinae were characterized by having four membrane cells, among other characters. Subsequently, Cobben (1961) described the new genus *Pseudosaldula*, with *Acanthia rogeri* Kirkaldy (= *Acanthia chilensis* Blanchard) as the type species, placing it in the Saldinae, tribe Chartoscirtini (= Saldoidini; see Polhemus and Chapman, 1979). He indicated unequivocally that the presence of five cells in the membrane was a diagnostic feature of the group. The fifth cell is always the smallest of the five and located in the laterobasal angle of cell 4, the latter located nearest the costal margin of the wing in the nomenclature of Cobben (1960). In *Pseudosaldula* spp., cell number 1 is always elongate, extending anteriorly to the apex of the claval commissure. In macropterous forms this cell is about the same width as cells 2–4, whereas in brachypterous forms it is much narrower than cells 2–4, although it remains elongate in most specimens. This cell structure varies from the condition seen in members of the Chiloxanthinae with five cells, where all of the cells are of more or less equal size. Some members of the Chiloxanthinae, such as *Paralosalda* Polhemus and Evans, have only four cells (see discussion in Polhemus and Chapman, 1979) and the structure of those cells is very similar to what is seen in members of the Saldinae.

Cobben (1960) further stated that *Pseudosaldula* represented a "relict group" on the basis of the membrane venation, but that it was nonetheless a member of the Saldinae on the basis of the short costal fracture and the structure of the male and female genitalia. Drake (1962) subsequently described the new genus *Oreokora*, with *Acanthia chilensis* Blanchard as the type species. Drake (1962) indicated that the species he placed in *Oreokora* often had five cells in the membrane, but that this number could vary, depending on the nature of forewing development, the more strongly brachypterous specimens sometimes showing a reduction in the number of cells in the membrane of the forewing. Drake (1962) commingled the

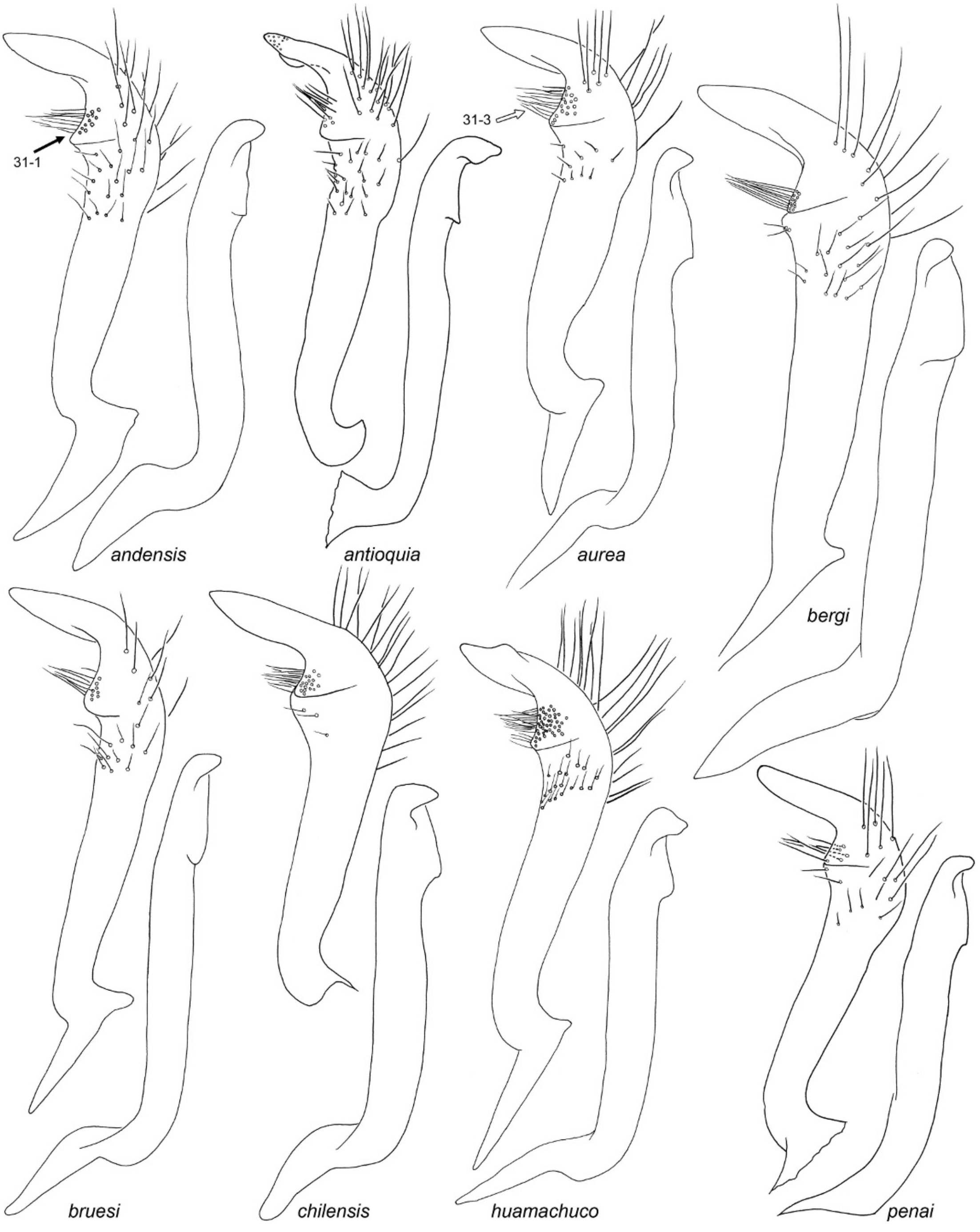


Fig. 2. Parameres of *Pseudosaldula andensis–penai*. Note: The point of insertion of many setae on the paramere cannot be seen because the paramere is heavily sclerotized and nearly opaque. Setae are therefore not drawn to show their exact distribution in many cases, but only to show their lengths and numbers. Nonetheless, the setae of the processes sensualis are drawn so as to accurately portray their number and distribution.

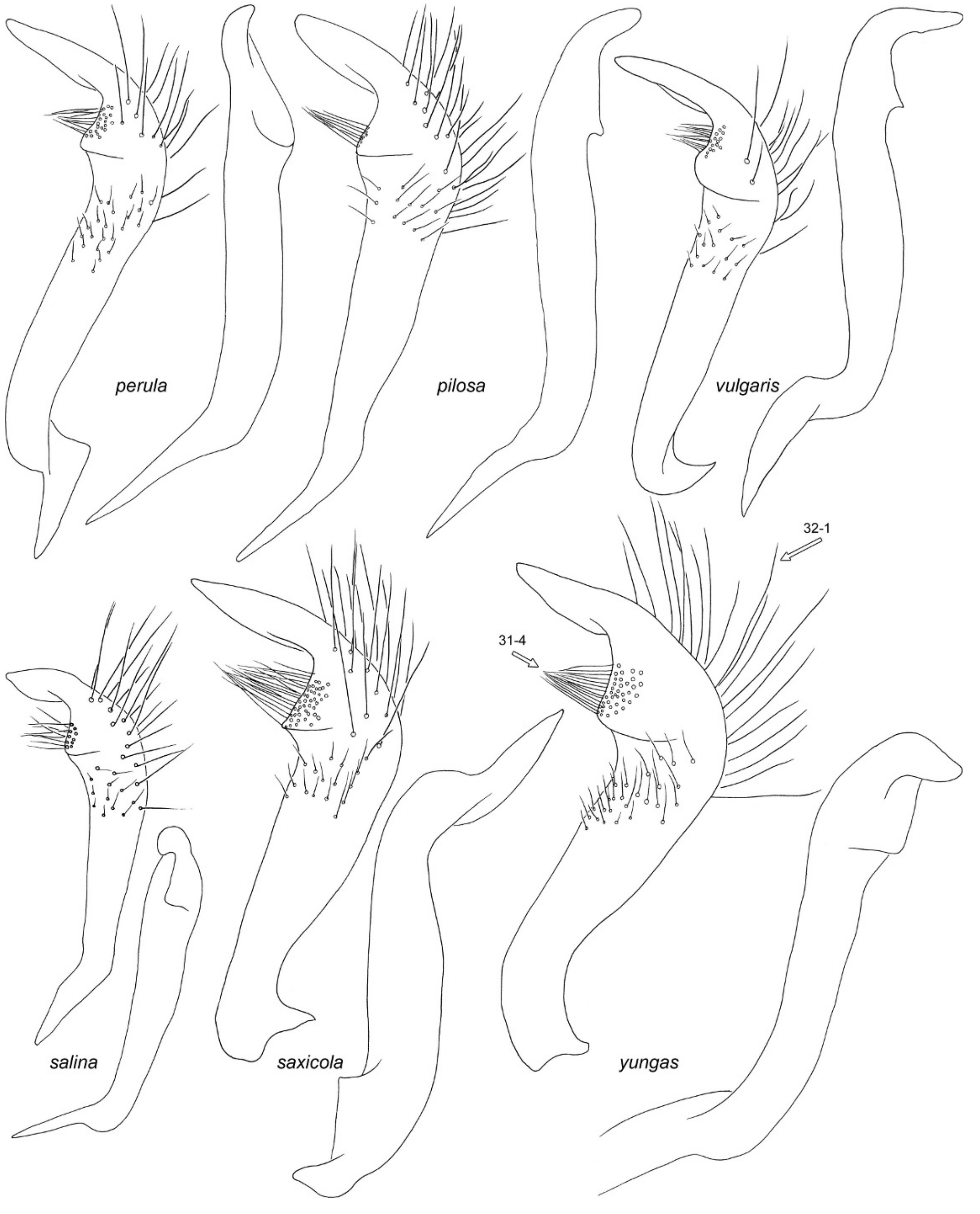


Fig. 3. Parameres of *Pseudosaldula perula–yungas*. Note: The point of insertion of many setae on the paramere cannot be seen because the paramere is heavily sclerotized and nearly opaque. Setae are therefore not drawn to show their exact distribution in many cases, but only to show their lengths and numbers. Nonetheless, the setae of the processes sensualis are drawn so as to accurately portray their number and distribution.

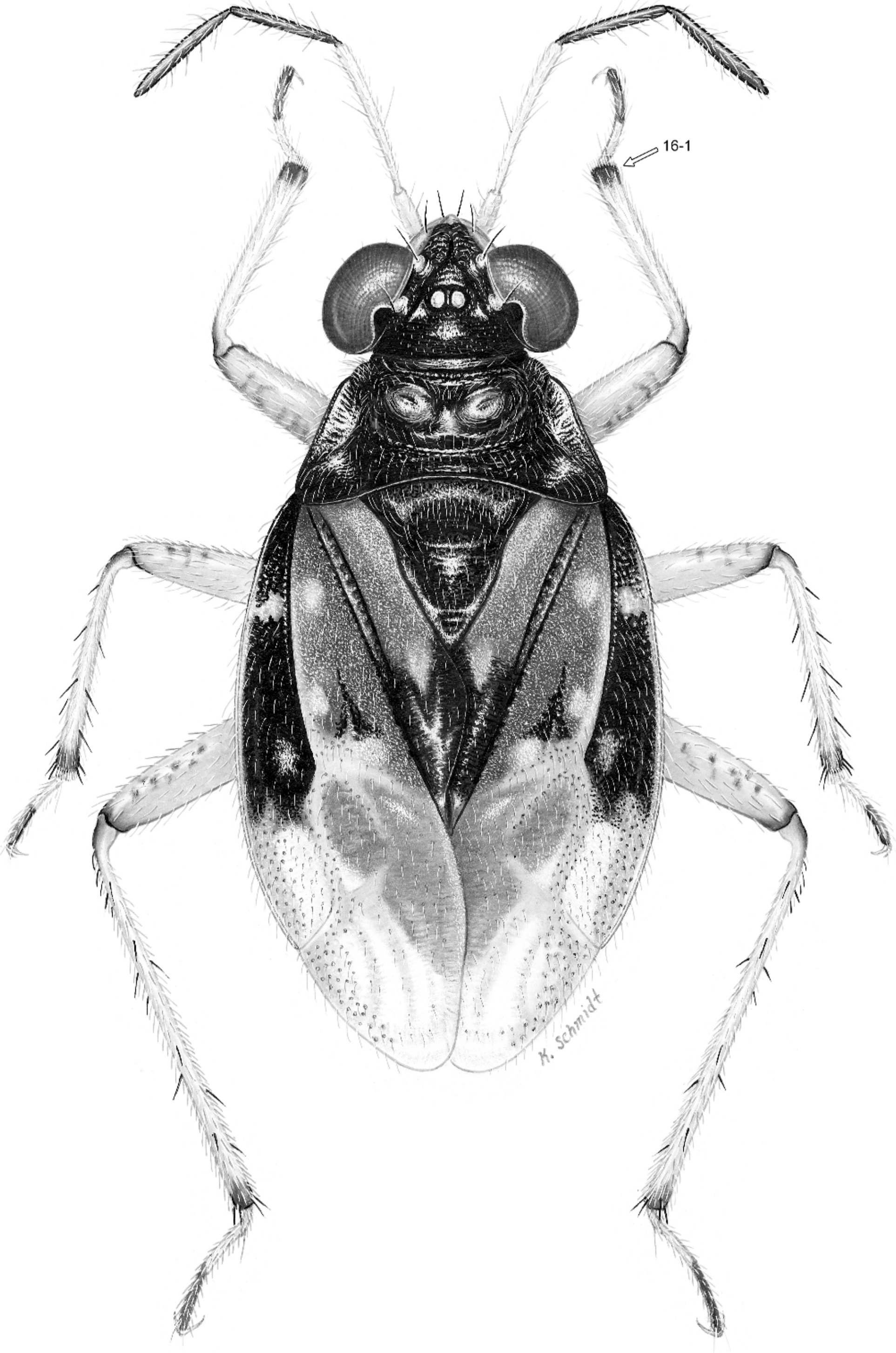


Fig. 4. Habitus of *Pseudosaldula andensis*, female.

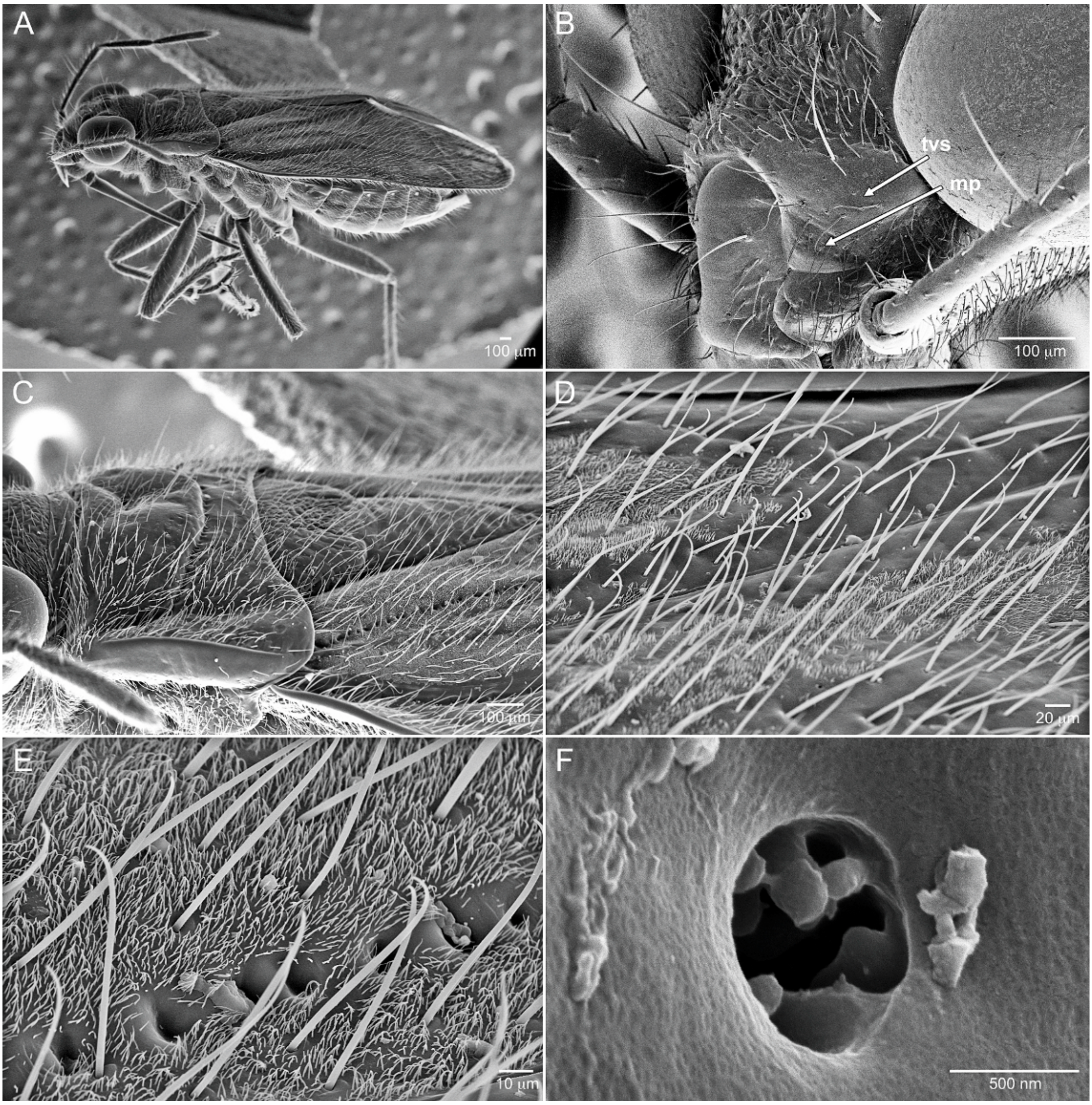


Fig. 5. *Pseudosaldula andensis* (scanning electron micrographs). **A.** Lateral view of whole specimen. **B.** Frontolateral view of face showing structure of transverse swelling across base of clypeus. **C.** Lateral view of pronotum, scutellum, and base of hemelytron showing erect setae on dorsum. **D.** Detail of scutellum and clavus showing erect setae and interface between areas of polished cuticle on scutellum and microtrichia on clavus. **E.** Detail of clavus and row of punctures along claval suture, showing suberect simple setae and microtricha. **F.** Detail of gland pore on paramere. **mp,** mandibular plate; **tvs,** transverse swelling.

attributes of macropterous and brachypterous forms in his characterization of *Oreokora*; furthermore, he made no comment on the issue of subfamily placement. Polhemus (1985) treated *Oreokora* as a junior synonym of *Pseudosaldula*. Polhemus (1985) corroborated the placement of *Pseudosaldula* in the Saldoidini in his analysis of phylogenetic relationships within the Saldidae. No mention of the taxonomy or systematic placement *Pseudosaldula* has appeared in the literature subsequent to that work.

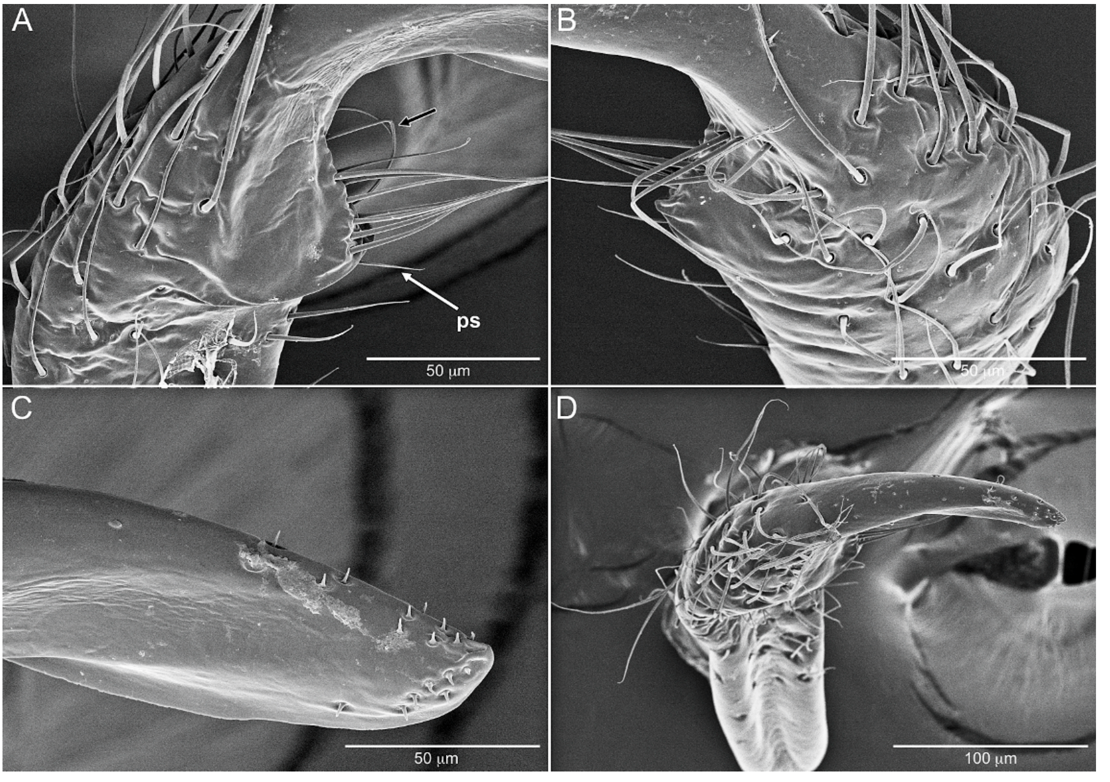


Fig. 6. *Pseudosaldula andensis* (scanning electron micrographs). Left paramere. **A.** Ventral face at level of processus sensualis. **B.** Dorsal face at level of processus sensualis. **C.** Apex of paramere, showing short setiform sensors. **D.** View of paramere from apical region along dorsal face of shaft. **ps,** processus sensualis.

We concur with Polhemus and Chapman (1979) that the simple counting of membrane cells is not an effective way to recognize phylogenetically meaningful characters in the Saldidae. We further conclude that the condition of the fifth cell in the forewing membrane in *Pseudosaldula* is, nonetheless, distinctive within the Saldidae, and is therefore synapomorphic for the taxon, as confirmed in our phylogenetic analysis of the group on the basis of a larger suite of characters (see below).

Nonetheless, *Pseudosaldula* is not alone in the Saldoidini in its possession of five membrane cells. Vinokurov (2004) described *Sinosalda* from northcentral China on the basis of a single male with five cells in the membrane (see also Diagnosis of *Pseudosaldula*).

Transverse swelling sensu Parsons (*postclypeus* sensu Cobben): Most members of the Saldoidini, to which *Pseudosaldula* belongs, have the face swollen dorsad of the mandibular plates and extending across the posterior (dorsal) margin of the clypeus (pl. 6, e.g., *Saldula ablusa* Drake and Hoberlandt, *S. coxalis* (Stål)). Cobben (1959, 1960) treated this swelling as a diagnostic feature for the Saldinae and referred to it as the postclypeus. Our examination of the face in *Pseudosaldula* indicates that the face adjacent to the posterior margin of the clypeus is not swollen and that it has the same texture and color as the remainder of the face (pl. 6, *Pseudosaldula* spp., figs. 5B, 9B), whereas in most, if not all, remaining Saldoidini the transverse swelling continues across the posterior margin of the clypeus and is of a contrasting coloration and texture to the remainder of the face (pl. 6, S. *ablusa*, *S. coxalis*, *S. laelaps* (White), *S. stoneri* Drake and Hoberlandt). *Sinosalda*, recently described from China (Vinokurov, 2004), lacks the connection of the transverse swelling across the base of the clypeus, as do *Pseudosaldula* spp.

Parson's (1962) identified the lateral swelling of the face in the Saldidae as probably distinct from the mandibular plates, referring to it as the *transverse swelling*. Based on her interpretation of muscle insertions, she offered an equivocal interpretation of whether the transverse swelling is actually part of a true postclypeus, part of the mandibular plates, or neither. Although the homology of the structures is not totally clear, the distinctive swollen nature of the face in many Saldoidini is less subject to interpretation. Furthermore, because the structure in question does not appear to represent a true postclypeus in the opinion of Parsons (1962), and because it appears to be distinct from the mandibular plates on the basis of external morphology, we have chosen to adopt the term *transverse swelling* in reference to that part of the face (See further discussion under Phylogenetic Analysis).

Gland pores on parameres (figs. 5F, 9F, 13C [glp], D 24F): As part of our scanning electron microscopic examination of the parameres, we observed in all species of *Pseudosaldula*, and examined members of the Saldoidini included as outgroups, a gland pore in the form of a circular pit with digitiform processes arising from the pit margin or from just within the pit. The structure does not appear to occur in the Chiloxanthinae, based on our examination of *Paralosalda innova* Polhemus and Evans. This particular structure has not been previously observed in the Saldidae, as for example in the extensive SEM examination of the Saldidae by Polhemus (1985), although it is similar in external structure to pores documented in the Triatominae by Catalá and Schofield (1994: fig. 3B, C; ornamented pores) and Weirauch (2008: fig. 23B). The latter author showed these pores to be associated with glandular units on the interior surface of the cuticle and we suggest that the pores in the Saldidae may also be gland pores. The diameter of the pore in most species we observed is approximately 300 nanometers (0.3 microns) whereas in the Triatominae it is 2–3 times that size.

Dorsal arolium (figs. 10B, D, F, 21D–F): In an effort to provide some additional documentation on the condition of the pretarsus, and particularly the dorsal arolium, we have used the scanning electron microscope to observe the condition in adult *Pseudosaldula chilensis* (Blanchard) and *Paralosalda innova*. To our knowledge, no observations have been made previously on members of the Chiloxanthinae. In both taxa, the dorsal arolium exists as a short setiform structure on the middle and hind legs only. These observations are in general conformity with those made by Schuh and Polhemus (1980) and Schuh and Slater (1995), although the dorsal arolium is known to occur on the forelegs in some taxa of Leptopodomorpha.

Nymphs: We have made what we believe to be positive associations of nymphs with adults for eight of the 14 recognized *Pseudosaldula* spp. We have restricted our description of the nymphs to coloration and vestiture under the genus, and to coding that information in our matrix for phylogenetic analysis of the group.

KEY TO THE SPECIES OF *PSEUDOSALDULA*

1. Antennal segment 1 with a black mark or stripe lateroventrally, sometimes also dorsomedially (pl. 6, *P. chilensis*, *P. salina*) 2
– Antennal segment 1 unicolorous, usually pale, sometimes weakly to moderately darkened but then always uniformly so (pl. 6, *P. bergi*, *P. vulgaris*) 4
2. Fore- and middle tibiae, and sometimes hind tibia, with a distinct, dark, contrasting stripe on dorsal surface. 3
– Tibiae never with contrasting stripe on dorsal surface, although sometimes weakly darkened; northwestern Argentina. . . *penai*, new species
3. Vestiture of dorsum largely golden and shining with illumination directed from anterolateral angle (pl. 3); antennal segment 1 with a longitudinal black stripe lateroventrally and also dorsomedially (pl. 6); clavus and corium largely black with some distinctive pruinose areas (pl. 6); Chile, Andean Argentina . . . . *chilensis* (Blanchard)
– Vestiture of dorsum black; antennal segment 1 with a single longitudinal black stripe only lateroventrally; corium with some large pale areas, never with pruinose areas (pl. 4); northwestern Argentina . . . . . . *salina*, new species

4. Hemelytron almost entirely dull, polished only at area of overlap along claval commissure and sometimes to a very limited extent along parts of corial margin 5
– Hemelytron with polished areas in addition to claval commissure, including embolar area, veins and other areas of corium, and often parts of membrane 8
5. Entire dorsum clothed with long, nearly erect, dark, generally dull, simple setae, giving a shaggy appearance in lateral view; length of hemelytral setae approximately twice medial diameter of hind tibia; northwestern Argentina, Lake Region of Chile . . . *pilosa*, new species
– Dorsum with shorter pubescence, reclining or recumbent, with at least some shining golden setae, not appearing shaggy in lateral view; hemelytral setae of length equal to or less than medial diameter of hind tibia 6
6. Pronotum campanulate, lateral margins weakly to strongly concave (fig. 16); antennal segment 2 very long, ratio of mean length of antennal segments 2:3 >1.48 (table 1); exocorium with an irregular, ivory maculation just proximad of apex (pl. 4; fig. 16); southern Peru to northwestern Argentina . . . . *saxicola*, new species
– Pronotum more flattened, not conspicuously campanulate, lateral margins weakly to conspicuously convex; antennal segment 2 not so long, ratio of mean length of antennal segments 2:3 <1.38; exocorium with at most a weak pale maculation just proximad of apex; 7
7. Corium uniformly covered with golden, shining, recumbent setae (pl. 5); corium, clavus, and sometimes membrane with multiple purplish, pruinose areas, most easily seen in dark-colored specimens; membrane with abundant long setae at least laterally on veins in brachypterous forms, setae less numerous in macropterous forms; Peru, Bolivia . . . . *vulgaris*, new species
– Corium with only scattered, golden, shining setae, never with a uniform covering, most setae on dorsum black (pls. 1, 2); corium, clavus, and membrane with at most inconspicuous purplish pruinose patches; membrane with scattered short to medium-length setae on veins; southern Chile and Andean Argentina . . . . *bergi* (Haglund)
8. Anterior 4/5 of exocorium and radial vein highly polished and shining, corium otherwise dull pl. 3); entire dorsum clothed with recumbent golden setae and suberect black setae of moderate length, both types of setae broadly distributed on forewing membrane; small, mean length male 2.71, female 2.82; northern Peru. . . . . *huamachuco*, new species
– Exocorium polished at least on posterior half of embolar area, often much more extensively, remainder of corium and veins polished or not; dorsal vestiture variable; larger, mean length males >2.90, females >3.13 9
9. Most of exocorium and at least some of posterior half of endocorium polished and shining (pl. 1, *P. andensis*; pl. 2, *P. bruesi*) 10
– Corium polished only on embolar area of exocorium; if polished area restricted to posterior half of embolar area, then radial vein also polished over entire length 11
10. Entire exocorium, much of endocorium posteriorly, and entire membrane in brachypterous specimens polished (basal one-third of membrane polished in macropterous specimens) (pl. 1); Ecuador, northern Peru . . . . *andensis* (Distant)
– Corium less extensively polished, exocorium with a dull area medially along radial vein, only basal area and veins of membrane polished in brachypterous forms (basal one-third of membrane polished in macropterous specimens) (pl. 2); northern Peru . . . *bruesi* (Drake)
11. Dorsum with only dark setae, never with conspicuously golden and shining setae; dorsum without pruinose areas; pronotum campanulate, lateral margin at least weakly concave 12
– Dorsum with a mixture of dark and golden shining setae; dorsum with pruinose areas; pronotum not evidently campanulate, lateral margins weakly to conspicuously convex . . . 13
12. Setae on dorsum long and erect, conspicuously so in lateral view; large, mean length male >4.31 (pl. 5); southern Peru, Bolivia . . . . *yungas*, new species
– Setae on dorsum erect, of medium length in lateral view; smaller, mean length male <2.95; western Colombia . . . *antioquia*, new species
13. Embolar area polished only on posterior half, radial vein polished and shining; setae on dorsum moderately long, suberect, shaggy in lateral view; northwestern Argentina . . . *aurea*, new species
– Embolar area polished over entire length, radial vein dull; setae on dorsum of medium length, suberect, not so shaggy in lateral view; northern Peru to northwestern Argentina . . . . *perula*, new species

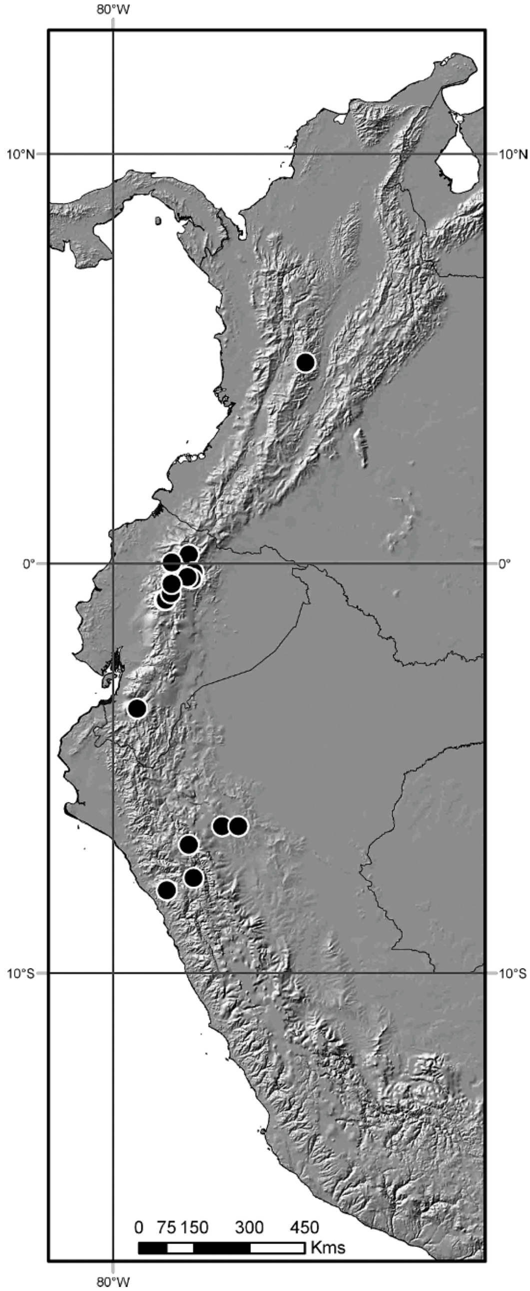
Pseudosaldula andensis (Distant)
Plates 1, 8F–H; figures 1, 4–6; map 1

Acanthia andensis Distant, 1891: 118 (n. sp.). – Distant, 1893: 93 (descr.).

Salda andensis: Lethierry and Severin, 1896: 216 (n. comb., cat.).
Saldula andensis: Drake and Hoberlandt, 1951: 5 (n. comb., cat.).
Pentacora andensis: Drake, 1955: 152. (n. comb.).
Oreokora andensis: Drake, 1962: 121 (n. comb.).
Pseudosaldula andensis: Schuh et al., 1987: 315 (n. comb., cat.).

DIAGNOSIS: Usually brachypterous; dorsum—including membrane of forewing—clothed with reclining, moderately elongate, simple, weakly golden setae, the dorsum highly polished except for dull basal two-thirds of the clavus and adjacent endocorium. Extensive hemelytral polishing restricted to *P. andensis* and *P. bruesi*, but exocorium entirely polished in *P. andensis* whereas exocorium with dull area medially along radial vein in *P. bruesi*; membrane in brachypterous specimens of *P. andensis* completely polished and shining, whereas only veins of membrane polished in *P. bruesi*; cells of membrane always coalesced and partially obscured in brachypterous forms of *P. andensis*, whereas all five cells always visible in *P. bruesi*.

REDESCRIPTION: *Male*: Total length 3.57, width pronotum 1.29. COLORATION (pl. 1): Hemelytron ranging from almost entirely dark, with cells transparent, to largely pale with only clavus, extreme base of corium, and medial portion of exocorium dark; antennal segment 1 usually largely pale, sometimes weakly darkened, segments 2, 3, and 4 more strongly darkened; legs, including coxae, largely pale, apex of foretibia with a contrasting, narrow, brown band. SURFACE AND VESTITURE (pl. 1; figs. 4, 5C–E): Basal two-thirds of clavus and adjacent endocorium dull, hemelytron otherwise polished and shining in brachypterous specimens, only basal portion of membrane polished in macropterous forms; hemelytron with a few small pruinose/pale areas. Vestiture of dorsum usually with numerous recumbent, golden, shining setae, often also with moderately long, suberect, dark setae, especially on clavus, corium, and membrane. STRUCTURE (pl., 1; figs. 4, 5): Usually brachypterous, rarely macropterous; body broadest at about level of midpoint of claval commissure. **Thorax**: Pronotum weakly campanulate, lateral margins ranging from nearly straight to weakly concave. *Hemelytra*: Cells of membrane always partly coalesced or obscured. GENITALIA (figs. 1, 6): **Parandria**: Inner sclerotized margin smoothly rounded; posterior margin weakly curving.



Map 1. Distribution of *Pseudosaldula andensis*.

Parameres: Processus sensualis with 10–15 setae.

Female (pl. 1): Total length 4.21, width pronotum 1.52. COLORATION (pl. 1; fig. 4): As in male; subgenital plate usually completely dark, occasionally broadly pale apically. SURFACE AND VESTITURE (fig. 5C–E): As in male, except membrane in macropterous form completely devoid of setae. STRUCTURE: **Abdomen**: See generic description. GENITALIA: See generic description.

DISTRIBUTION: Central Colombia to Northern Peru.

HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between 2300–4000 meters. Available habitat data indicate that specimens have been collected on seeps and muddy margins of small streams and small lakes. Some specimens have been taken in more temporary habitats along roadsides and on sandy stream margins.

DISCUSSION: Drake's (1962) synonymy of *bruesi* Drake and Hoberlandt with *andensis* Distant is erroneous, based on our examination of the types and other material. The holotype of *P. andensis* is representative of the darker forms for the species. Distant (1891) indicated that he had "a single example" of *andensis*; thus, the lectotype label affixed to the type by Cobben is unnecessary.

HOLOTYPE: brachypterous female, "Type; Machachi, Ecuador, 9–10,000 feet, Ed. Whymper [0.5°S 78.5667°W, 2873 m]; 1368 (32); Distant Coll. 1911-383; *Acanthia andensis* Dist.; LECTOTYPE *S. andensis* Dist., R. H. Cobben 1961." Deposited in the BMNH.

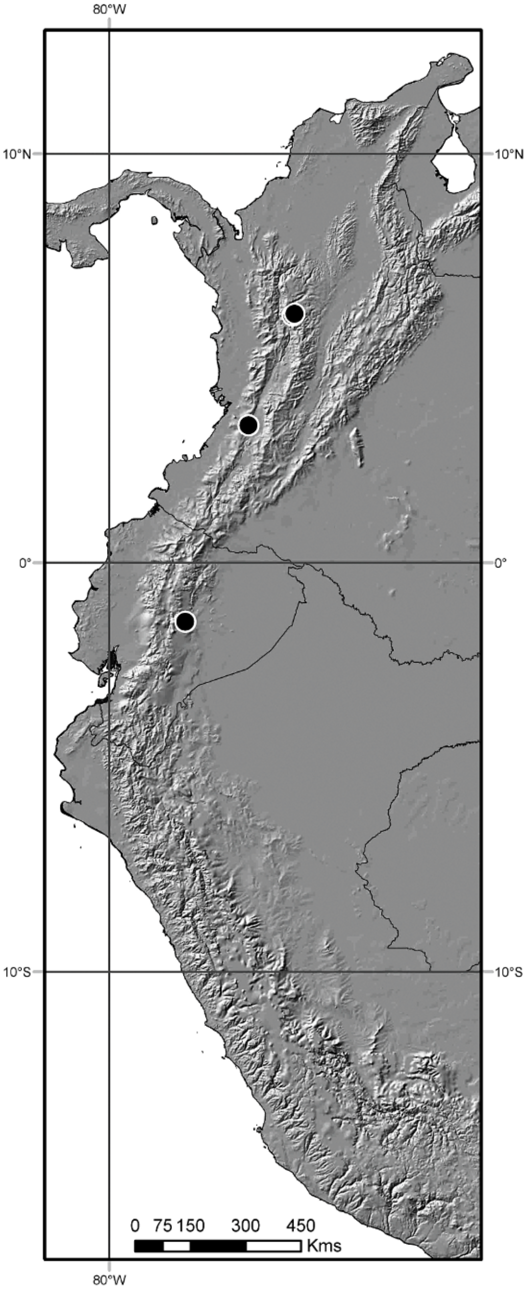
SPECIMENS EXAMINED: **COLOMBIA: Caldas:** Mt. Ruiz, 4.9°N 75.3°W, 4000 m, 21 Aug 1969, D.H. Messersmith, 1♂ (AMNH_ENT 00022198) (USNM). **ECUADOR: Cotopaxi:** 13 km W of Pujili, 0.87001°S 78.7246°W, 3550 m, 02 Feb 1976, R.T. Schuh, 1♂ (AMNH_ENT 00023279), 5 nymphs (AMNH_ENT 00023987, AMNH_ENT 00023988), 4♂ (AMNH_ENT 00021612–AMNH_ENT 00021613, AMNH_ENT 00022174–AMNH_ENT 00022175), 4♀ (AMNH_ENT 00021609–AMNH_ENT 00021611, AMNH_ENT 00022176) (AMNH). 1♂ (AMNH_ENT 00023769), 1♀ (AMNH_ENT 00023773) (JTPC). 20 km W of Pujili, 0.89941°S 78.73955°W, 3700 m, 02 Feb 1976, R.T. Schuh, 3♂ (AMNH_ENT 00022179–AMNH_ENT 00022181), 2♀ (AMNH_ENT 00022177, AMNH_ENT 00022178) (AMNH). 22 km W of Pujili, 0.89938°S 78.74185°W, 3650 m, 02 Feb 1976, R.T. Schuh, 3♂ (AMNH_ENT 00022169–AMNH_ENT 00022171), 2♀ (AMNH_ENT 00022172, AMNH_ENT 00022173) (AMNH). 9 km W of Pujili, 0.88965°S 78.71362°W, 3300 m, 02 Feb 1976, R.T. Schuh, 6♂ (AMNH_ENT 00020087–AMNH_ENT 00020088, AMNH_ENT 00023268–AMNH_ENT 00023270, AMNH_ENT 00023627), 2♀ (AMNH_ENT 00023271, AMNH_ENT 00023272), 17♂ (AMNH_ENT 00022140–AMNH_ENT 00022156), 29♀ (AMNH_ENT 00021550–AMNH_ENT 00021577, AMNH_ENT 00021590) (AMNH). 4♂ (AMNH_ENT 00022161–AMNH_ENT 00022164), 4♀ (AMNH_ENT 00021586–AMNH_ENT 00021589) (EELM). 4♂ (AMNH_ENT 00023765–AMNH_ENT 00023768), 7♀ (AMNH_ENT 00023774–AMNH_ENT 00023780) (JTPC). 4♂ (AMNH_ENT 00022157–AMNH_ENT 00022160), 4♀ (AMNH_ENT 00021582–AMNH_ENT 00021585) (IMLA). 4♂ (AMNH_ENT 00022165–AMNH_ENT 00022168), 4♀ (AMNH_ENT 00021578–AMNH_ENT 00021581) (USNM). NW slope Mt Cotopaxi, 0.21667°N 78.15°W, 3500 m, 26 Jul 1969–05 Aug 1969, P. and B. Wygodzinsky, 1♀ (AMNH_ENT 00022195) (AMNH). **Loja:** 8 km S of Manu, Rio Achucay, 3.55°S 79.41°W, 2470 m, 07 Nov 1987, J. Rawlins, C. Young, R. Davidson, 1♀ (AMNH_ENT 00023770) (JTPC). **Napo:** 10 km E of Papallacta, 0.37°S 78.08°W, 2620 m, 05 Feb 1976, R.T. Schuh, 2♂ (AMNH_ENT 00023273, AMNH_ENT 00023764), 1♀ (AMNH_ENT 00023274), 1♂ (AMNH_ENT 00022186), 3♀ (AMNH_ENT 00022187–AMNH_ENT 00022189) (AMNH). 3 km N of Papallacta, 0.33955°S 78.13333°W, 3250 m, 03 Feb 1976, R.T. Schuh, 4 nymphs (AMNH_ENT 00023954) (AMNH). 52 km E of Quito, 0.22°S 78.03°W, 3800 m, 03 Feb 1976, R.T. Schuh, 1♂ (AMNH_ENT 00023280), 4♂ (AMNH_ENT 00021595–AMNH_ENT 00021598), 4♀ (AMNH_ENT 00021599–AMNH_ENT 00021602) (AMNH). Laguna Papallacta, Papallacta, 0.37°S 78.08°W, 3300 m, 05 Feb 1976, R.T. Schuh, 1♂

(AMNH_ENT 00023275), 3♀ (AMNH_ENT 00023276–AMNH_ENT 00023278), 3♂ (AMNH_ENT 00021603–AMNH_ENT 00021605), 3♀ (AMNH_ENT 00021606–AMNH_ENT 00021608) (AMNH). **Pichincha:** 23 km N of Latacunga, 0.73°S 78.59°W, 3000 m, 02 Feb 1976, R.T. Schuh, 4♂ (AMNH_ENT 000-21591–AMNH_ENT 00021594) (AMNH). 24 km S of Quito, 0.43358°S 78.5°W, 2700 m, 02 Feb 1976, R.T. Schuh, 2 nymphs (AMNH_ENT 00023955) (AMNH). 28 km S of Quito, 0.44104°S 78.56115°W, 2700 m, 01 Feb 1976, R.T. Schuh, 20 nymphs (AMNH_ENT 00023956), 8♂ (AMNH_ENT 000-23180–AMNH_ENT 00023187), 13♀ (AMNH_ENT 00021620–AMNH_ENT 00021632) (AMNH). 3 km W of 30–71 jct, en route to Santo Domingo de los Colorados, 2800 m, 01 Feb 1976, R.T. Schuh, 1♀ (AMNH_ENT 00023953), 2 nymphs (AMNH_ENT 000-23953) (AMNH). 48 km E of Quito, 0.33589°S 78.18247°W, 3850 m, 03 Feb 1976, R.T. Schuh, 2♂ (AMNH_ENT 00021618, AMNH_ENT 00021619), 3♀ (AMNH_ENT 00021614–AMNH_ENT 000-21616) (AMNH). 1♀ (AMNH_ENT 000-23772) (JTPC). 5 km W of Calacali, 0.02°N 78.56°W, 2600 m, 06 Feb 1976, R.T. Schuh, 1♀ (AMNH_ENT 00023281), 3♂ (AMNH_ENT 00022182–AMNH_ENT 00022184), 1♀ (AMNH_ENT 00022185) (AMNH). **PERU: Amazonas:** Chachapoyas, 6.41667°S 77.33333°W, 2300 m, 12 Jul 1972, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00023266), 3♂ (AMNH_ENT 00022192–AMNH_ENT 00022194) (AMNH). Molinopampa, 43 km E Chachapoyas, 6.41652°S 76.94229°W, 2300 m, 11 Jul 1972, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00023464), 2♂ (AMNH_ENT 00022190, AMNH_ENT 00022191) (AMNH). **Cajamarca:** Celendin, Rio Grande, 6.8703°S 78.1517°W, 2625 m, 17 Jun 1936, F. Woytkowski, 1♀ (AMNH_ENT 00023771) (JTPC). Rio Lallanga, vicinity of Llangua, 14 Jun 1936, F. Woytkowski, 1♂ (AMNH_ENT 00023267) (SEMC). **La Libertad:** 25 km S of Cajabamba, 7.6748°S 78.03022°W, 3000 m, 20 Jan 1976, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00022197) (AMNH). Samne, ca 40 km NE of Trujillo, 7.98333°S 78.68333°W, 1500 m, 12 Jul 1975, C. Porter and L. Stange, 1♂ (AMNH_ENT 00023646) (IMLA).

Pseudosaldula antioquia, new species
Plate 1; figures 1, 2; map 2

DIAGNOSIS: Recognized by the relatively small size, with a length of 2.82–3.12, extreme northerly Andean distribution, campanulate pronotum with a concave lateral margin, and the hemelytral vestiture of black, moderately long, suberect setae. Usually strongly brachypterous with only three or four cells in the forewing membrane; most known specimens with largely pale hemelytra. Most similar to *P. saxicola* and *P. yungas* in pronotal structure and the presence of a distinctive white macula posteriorly on the exocorium, but both of those species much larger and with a more southerly distribution and *P. saxicola* with a uniform covering of golden shining setae on the dorsum in contrast to the erect black vestiture found in both *P. antioquia* and *P. yungas*.

DESCRIPTION: *Male*: Total length 2.95, width pronotum 1.07. COLORATION (pl. 1): Hemelytron, including cells of membrane, ranging from largely dark to mostly pale with dark veins, always with contrasting white spots on clavus and corium, including a large contrasting white macula subapically on corium; pronotum with lateral margins broadly and irregularly pale to completely black dorsally, always with at least a small pale spot ventrally; antennal segment 1 usually largely pale, sometimes weakly darkened, segments 2, 3, and 4 more strongly darkened, apex of segment 4 usually weakly pale; legs, including coxae, largely pale, apex of foretibia with a contrasting, narrow, brown band. SURFACE AND VESTITURE: Clavus and corium dull except for polished embolar area, membrane weakly polished; hemelytron without pruinose areas. Vestiture of dorsum with numerous, moderately long, suberect, dark setae, except membrane largely devoid of setae. STRUCTURE (pl. 1): Usually brachypterous, rarely submacropterous, body broadest just posterior to apex of claval commissure. **Thorax**: Pronotum weakly campanulate, lateral margins weakly concave. *Hemelytra*: Cells of membrane frequently partly coalesced or obscured, usually with four cells. GENITALIA (figs. 1, 2): **Parandria**: Inner sclerotized



Map 2. Distribution of *Pseudosaldula antioquia*.

margin smoothly rounded; posterior margin emarginated medially. **Parameres**: Processus sensualis with 10–15 setae.

Female (pl. 1): Total length 3.13, width pronotum 1.15. COLORATION (pl. 1): As in male; subgenital plate broadly pale apically. SURFACE AND VESTITURE: As in male. STRUCTURE: **Abdomen**: See generic description. GENITALIA: See generic description.

ETYMOLOGY: Named for its occurrence in the Colombian department of Antioquia; a noun in apposition.

DISTRIBUTION: Known from the central and western Andes in Colombia and from central Ecuador.

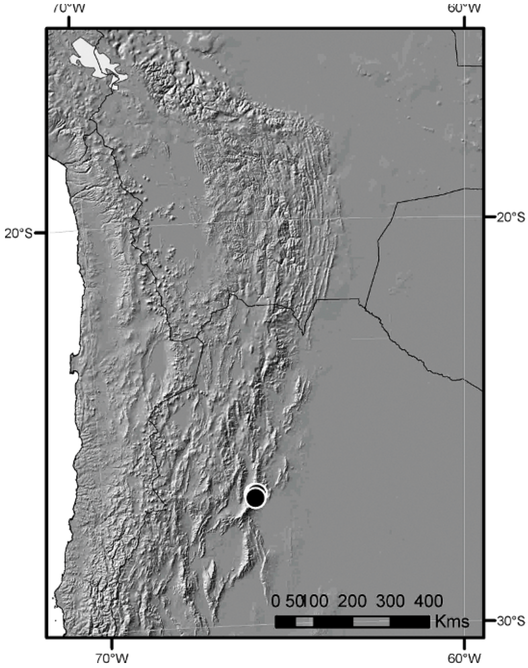
HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between 1550–2015 meters. Available habitat data indicate that all specimens were collected on seepage over rock outcrops or from vertical clay banks.

DISCUSSION: *Pseudosaldula antioquia* is known from relatively low elevations compared to other species of the genus that are found at relatively low latitudes. With the exception of *P. andensis*, it is apparently the only species of *Pseudosaldula* that occurs in Colombia—and the northern Andes more generally—as deduced from extensive collecting in suitable habitats by the senior author in the *paramos* around Bogota, Colombia in 1976 and Merida, Venezuela in 1982, efforts that produced no specimens of *Pseudosaldula*.

HOLOTYPE: **COLOMBIA: Valle del Cauca:** upper Rio Pance near El Topacio, Farallones de Cali National Park, [3.355°N 76.59856°W], 1550 m, 27 Jul 1989, D. A. and J. T. Polhemus, 1♂ (AMNH_ENT 00023-282) (USNM).

PARATYPES: **COLOMBIA: Antioquia:** Municipio de El Retiro, Quebrada Agudelo near El Retiro, 6.04833°N 75.5225°W, 2015 m, 19 Jul 1989, D. A. and J. T. Polhemus, 1♂ (AMNH_ENT 00024009) (AMNH). 6♂ (AMNH_ENT 00023286, AMNH_ENT 00023408–AMNH_ENT 00023409, AMNH_ENT 00024006–AMNH_ENT 00024008), 6♀ (AMNH_ENT 000-23410–AMNH_ENT 00023412, AMNH_ENT 00024010–AMNH_ENT 00024012) (JTPC). Municipio de El Retiro, Tequendamita Waterfall, 6.0823°N 75.47603°W, 2230 m, 19 Jul 1989, D. A. and J. T. Polhemus, 1♂ (AMNH_ENT 00023284), 1♀ (AMNH_ENT 00023285) (AMNH). **Valle del Cauca:** upper Rio Pance near El Topacio, Farallones de Cali National Park, 3.355°N 76.59856°W, 1550 m, 27 Jul 1989, D. A. and J. T. Polhemus, 1♂ (AMNH_ENT 00024073) (AMNH). 1♀ (AMNH_ENT 00023283) (JTPC); 29 Jul 1989, J. T. and D. A. Polhemus, 2♂ (AMNH_ENT 00024003, AMNH_ENT 00024004) (JTPC). **ECUADOR: Tungurahua:** Tungurahua, 32 km E of Banos, 1.449°S 78.142°W, 1100 m, 29 Jan 1976, P. Spangler, 1♂ (AMNH_ENT 00023781) (JTPC).

OTHER SPECIMENS EXAMINED: **COLOMBIA: Antioquia:** Municipio de El Retiro, Quebrada Agudelo near El Retiro, 6.04833°N 75.5225°W, 2015 m, 19 Jul 1989, D. A. and J. T. Polhemus, 2 nymphs (AMNH_ENT 00023413, AMNH_ENT 00024013) (JTPC). **Valle del Cauca:** upper Rio Pance near El Topacio, Farallones de Cali National Park, 3.355°N 76.59856°W, 1550 m, 29 Jul 1989, J. T. and D. A. Polhemus, 1 nymph (AMNH_ENT 00024005) (JTPC).



Map 3. Distribution of *Pseudosaldula aurea*.

Pseudosaldula aurea, new species
Plates 1, 8E; figures 1, 2; map 3

DIAGNOSIS: Usually brachypterous; recognized by the vestiture of the dorsum consisting of reclining, simple, golden, shining setae intermixed with relatively long, reclining, black setae giving a shaggy appearance in lateral view, and the dull hemelytra with only the radial vein and a portion of the embolar area polished. Similar to *P. perula* in type of vestiture on dorsum, but that species lacking polished posterior half radial vein and with setae on dorsum somewhat longer.

DESCRIPTION: *Male*: Total length 3.37, width pronotum 1.32. COLORATION (pl. 1): Hemelytron ranging from almost entirely dark, with cells of membrane at least partially—and some small areas of corium contrastingly—pale, to hemelytron largely pale with basal two-thirds of clavus and adjacent corium dark; weak pruinose areas evident in darker-colored specimens; antennal segments 1 and 2 pale to weakly darkened, segments 3 and 4 more strongly darkened; legs, including at least apical portion of coxae, largely pale. SURFACE AND VESTITURE (pl. 1): Hemelytron, including membrane, dull except radial vein and portions of embolar area polished. Vestiture of the dorsum consisting of reclining, simple, golden, shining setae intermixed with relatively long, reclining, black setae, the latter giving a shaggy appearance in lateral view; membrane veins with only a few short setae. STRUCTURE (pl. 1): Known only from brachypterous forms; body broadly ovoid. **Thorax**: Pronotum with lateral margins weakly to distinctly convexly rounded. *Hemelytra*: Membrane of forewing usually with five distinct cells in brachypterous forms. GENITALIA (figs. 1, 2): **Parandria**: Inner sclerotized margin smoothly rounded; posterior margin weakly curving. **Parameres**: Processus sensualis with ~20 setae.

Female (pl. 1): Total length 4.22, width pronotum 1.58. COLORATION (pl. 1): As in male; subgenital plate entirely dark. SURFACE AND VESTITURE (pl. 1): As in male. STRUCTURE: **Abdomen**: See generic description. GENITALIA: See generic description.

ETYMOLOGY: Named for the golden, shining setae on the dorsum, from the Latin *aureus*, "golden".

DISTRIBUTION: Tucuman Province, northern Argentina, at locations above the town of Tafi del Valle.

HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between 1550–2015 meters. Available habitat data indicate specimens were collected on a large, permanent, densely vegetated seep and on a muddy area near the road.

DISCUSSION: This species is at present known from only very limited collections.

HOLOTYPE: **ARGENTINA: Tucuman:** 15 km NW of Tafi del Valle, [26.77°S 65.79°W], 2800 m, 02 Jan 1982–03 Jan 1982, R.T.Schuh and B. Massie, 1♂ (AMNH_ENT 00023290) (AMNH).

PARATYPES: **ARGENTINA: Tucuman:** 15 km NW of Tafi del Valle, 26.77°S 65.79°W, 2800 m, 02 Jan 1982–03 Jan 1982, R.T.Schuh and B. Massie, 1♂ (AMNH_ENT 00023289), 2♀ (AMNH_ENT 00023291, AMNH_ENT 00023292) (AMNH). 16 km W of Tafi del Valle on Rt 307, 26.7685°S 65.73083°W, 2900 m, 21 Feb 1993, R. T. Schuh and J. T. Polhemus, 1♂ (AMNH_ENT 00020865), 1♀ (AMNH_ENT 00020872) (AMNH). 1♂ (AMNH_ENT 00023288) (IMLA). 8 km W of Tafi del Valle, 26.87°S 65.77°W, 2500 m, 03 Jan 1982, R. T. Schuh and B. M. Massie, 2♂ (AMNH_ENT 00023287, AMNH_ENT 00023944) (AMNH). 1♂ (AMNH_ENT 000-23832), 1♀ (AMNH_ENT 00023833) (JTPC).

Pseudosaldula bergi (Haglund)

Plates 1, 2, 6, 7A, B; figures 1, 2, 7; map 4

Salda bergi Haglund, 1899: 176 (n. sp.).
Saldula sola Drake and Carvalho, 1948: 476 (n. sp.). NEW SYNONYMY.
Saldula paralia Torres, 1954: 88 (n. sp.). NEW SYNONYMY.
Pseudosaldula cobbeni China, 1962: 715 (n. sp.). NEW SYNONYMY.
Oreokora bergi: Drake, 1962: 121 (n. comb.).
Oreokora sola Drake, 1962: 122 (n. comb.).
Pseudosaldula paralia: Polhemus, 1976: 236 (n. comb.).
Pseudosaldula bergi: Schuh et al., 1987: 315 (n. comb., cat.).

DIAGNOSIS: All known specimens brachypterous, females relatively large, heavy bodied; head, pronotum, and scutellum moderately polished, hemelytra uniformly dull except for narrow polished area along claval commissure; vestiture of dorsum composed of mostly dull, reclining, dark, relatively short, simple setae with a very few golden shining setae intermixed. Potentially confused with *P. pilosa*, except that species with long, erect, dark vestiture on dorsum. In contrast with most other *Pseudosaldula* spp., *P. bergi* usually found at the upper margin of the intertidal zone in the southerly part of the overall distributional range of the genus.

REDESCRIPTION: *Male*: Total length 3.69, width pronotum 1.35. COLORATION (pls. 1, 2): Hemelytron ranging from almost entirely dark with cells of membrane and some areas of adjacent corium weakly pale, to totally pale with only a few small dark markings on hemelytron; antennal segments 1 and 2 pale to weakly darkened, segments 3 and 4 more strongly darkened; legs, including at least apical portion of coxae, largely pale. SURFACE AND VESTITURE (pls. 1, 2; figs. 7B–D): Corium and membrane dull except along claval commissure. Vestiture of dorsum, including veins of membrane composed of mostly dull, reclining, dark, relatively short, simple setae with a few golden shining setae intermixed. STRUCTURE (pls. 1, 2): Known only from brachypterous forms, body in most specimens teardrop shaped, broadest just posterior to midpoint of claval commissure. **Thorax**: Pronotum with lateral margins nearly straight, distinctly narrowed anteriorly. *Hemelytra*: Membrane of forewing usually with five distinct cells, sometimes reduced to four in brachypterous forms. GENITALIA (figs. 1, 2, 7E–G): **Parandria**: Inner sclerotized margin smoothly rounded; posterior margin weakly curving. **Parameres**: Processus sensualis with 10–15 setae.

Female (pl. 2): Total length 4.22, width pronotum 1.58. COLORATION (pl. 2): As in male; subgenital plate broadly translucent apically. SURFACE AND VESTITURE (pl. 2): As in male. STRUCTURE: **Abdomen**: See generic description. GENITALIA: See generic description.

HABITAT DATA AND ALTITUDINAL RANGE: Most known collection localities range from sea level in Chile to about 800 meters in Chubut and Neuquen provinces of western Argentina. Available habitat

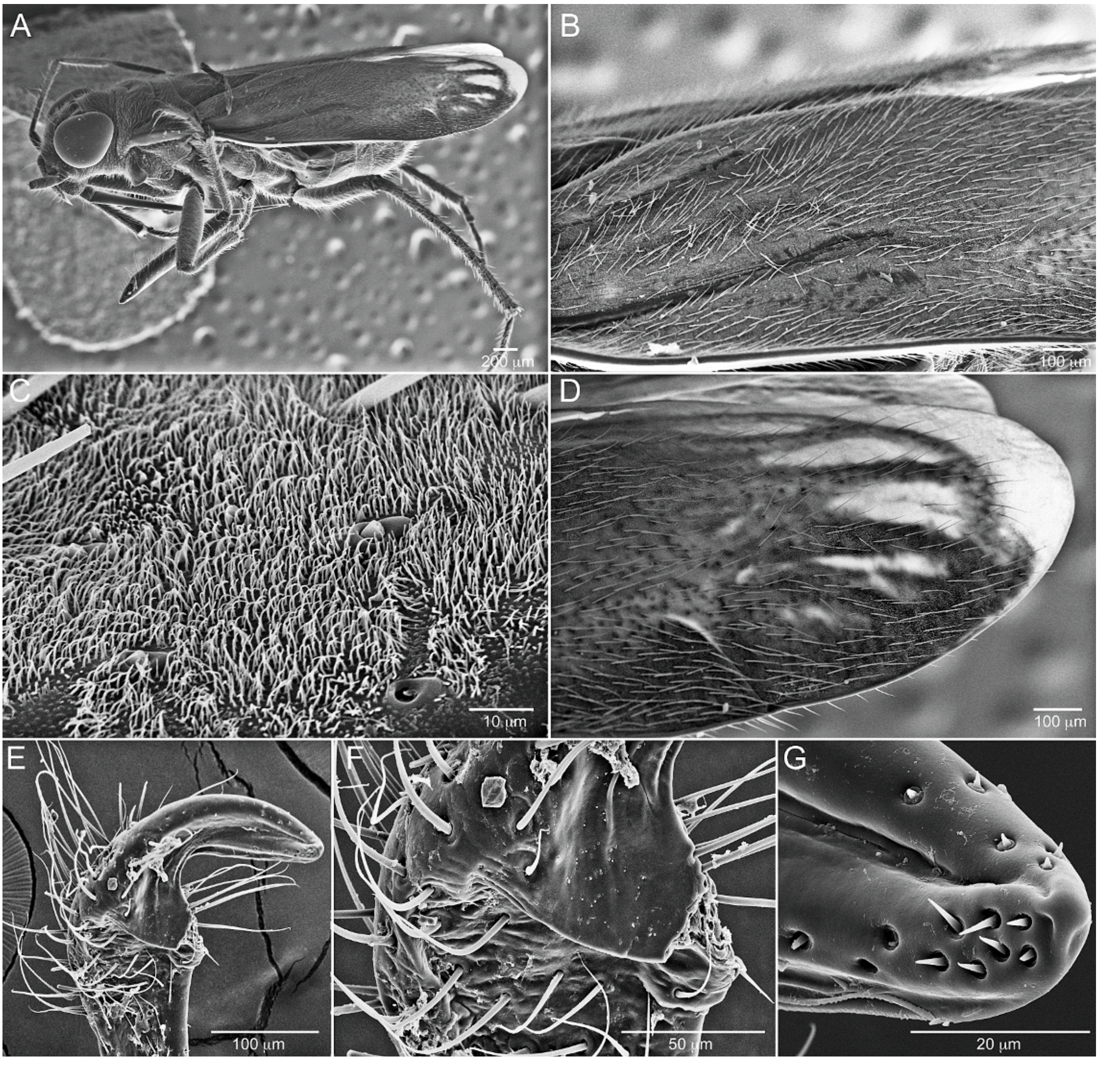
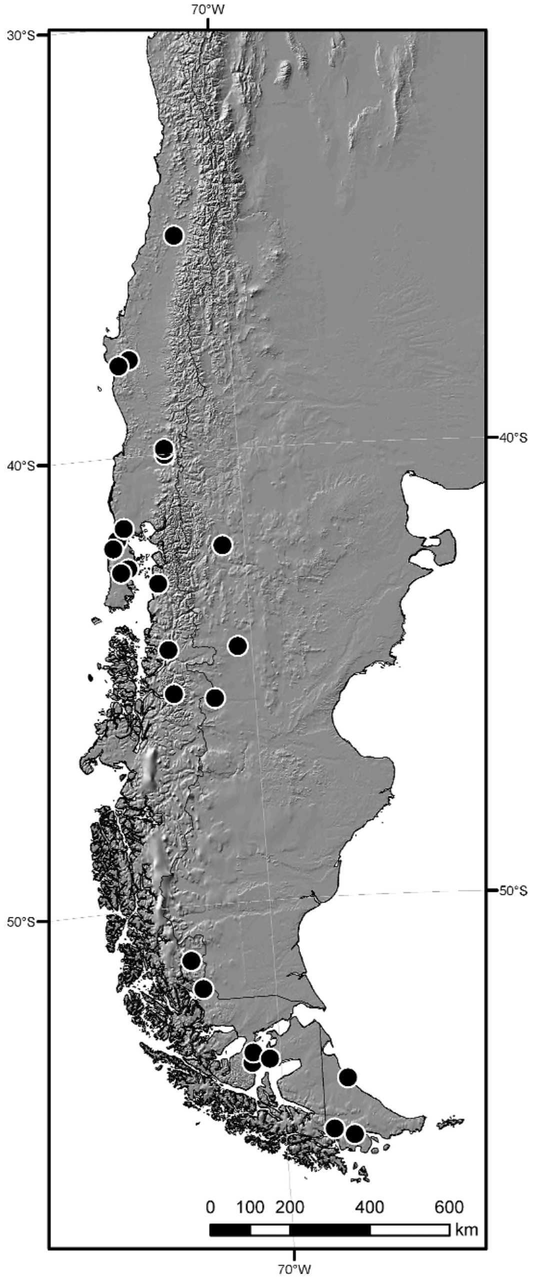


Fig. 7. *Pseudosaldula bergi* (scanning electron micrographs). **A.** Lateral view of whole specimen. **B.** Lateral view of base of hemelytron showing short recumbent setae and dense covering of microtrichia on dorsum and polished radial vein. **C.** Microtricha on forewing. **D.** Membrane of forewing showing setae on veins. **E.** Ventral face of left paramere, apical half. **F.** Detail of ventral face of left paramere at level of processus sensualis. **G.** Apex of left paramere showing short setiform sensors.

data indicate that about 25% of the collecting localities are relatively protected areas of coastline with short vegetative cover at the high tide mark. Remaining collections are about equally divided between muddy areas with some short, emergent vegetation and seep areas, often with matlike vegetation.

DISTRIBUTION: Lake Region of Chile south to Tierra del Fuego, as well as from the adjacent foothill area of the Andes in Chubut and Neuquen provinces of Argentina.

DISCUSSION: Comparison of the type specimens of *bergi* Haglund, *cobbeni* China, *sola* Drake, and paratypes of *paralia* Torres indicates that all four are synonyms, the first having priority. The holotype of *P. bergi* is of the light-colored morph of the species, with completely pale hemelytra and the pronotum with very broad, pale, lateral margins. The



Map 4. Distribution of *Pseudosaldula bergi*.

holotype of *sola*, with the exception of the clavus adjacent to the scutellum, has hemelytra of an almost totally uniform rust color. The holotype of *cobbeni* is of the dark-colored morph of the species, with the hemelytra almost totally castaneous to nearly black, with the exception of the pale maculations characteristic of all *Pseudosaldula* spp.

Drake's (1962) synonymy of *Saldula lynchi* Drake and Carvalho with *bergi* Haglund is almost certainly erroneous. The type locality for *lynchi*, Chascomus, in Buenos Aires Province, is completely out of the known range of all *Pseudosaldula* spp. We have not been able to locate the type of *lynchi*, although Drake and Carvalho (1948) indicated that it was deposited in the Museo de la Plata, Argentina.

HOLOTYPE: brachypterous female, "Gente, Grande Bay; Tierra del Fuego; O Nordenskiöld; 27/12.95; Typus; *Salda bergi* Typ! Hagl." Deposited in Natural History Museum, Stockholm.

HOLOTYPES OF SYNONYMS: *Pseudosaldula cobbeni* China: brachypterous male, "shore; Type; CHILE: Puerto Williams, 29.i.1959; Roy. Soc. Exped. S. Chile 1958–59, G. Kuschel Coll.; specimen figured; *Pseudosaldula cobbeni* China HOLOTYPE, W. E. China det. 1962." Deposited in the BMNH. *Pseudosaldula sola* Drake and Carvalho: brachypterous male, "Rio Negro, Argentina; *Saldula sola* Drake; C. J. Drake Coll. 1956." Deposited in the USNM. Holotype of *Pseudosaldula paralia* (Torres) from Rio Grande, Tierra del Fuego, which is deposited in the Museo de la Plata, La Plata, Argentina, was examined, but not compared directly with other types.

SPECIMENS EXAMINED: **ARGENTINA: Chubut:** 108 km W of Rio Mayo, 45.56°S 71.26°W, 720 m, 21 Jan 1986, R.T. Schuh and N.I. Platnick, 1♀ (AMNH_ENT 00022572) (AMNH). **Neuquen:** 51 km S of San Martin de los Andes, 44.45°S 70.43°W, 800 m, 12 Jan 1986, R.T. Schuh and N.I. Platnick, 2♀ (AMNH_ENT 00022570, AMNH_ENT 00022571) (AMNH). **Tierra del Fuego:** Ushuaia, 54.8°S 68.3°W, 21 Jan 1960, A.O. Bachmann, 1♀ (AMNH_ENT 00023873) (JTPC). 2♂ (AMNH_ENT 00023871, AMNH_ENT 00023872) (MACN). **CHILE: Aisen del Gen. Carlos Ibanez del Campo - Region XI:** ***Aisen Prov.:*** Reserva Nac Rio Simpson, Rio Simpson btwn Coyhaique & Aisen, 45.4°S 72.53°W, 20 m, 20 Jan 1986, R.T. Schuh and N.I. Platnick, 2♀ (AMNH_ENT 00022573, AMNH_ENT

00022574) (AMNH). 3 km S of Puyuguape, shore line of Puyuguape Channel, 44.42°S 72.58°W, 310 m, 19 Jan 1986, R.T. Schuh, 3♂ (AMNH_ENT 00023967), 3♀ (AMNH_ENT 00023967), 20 nymphs (AMNH_ENT 00023967), 30♂ (AMNH_ENT 00022355–AMNH_ENT 00022384), 15♀ (AMNH_ENT 00022385–AMNH_ENT 00022392, AMNH_ENT 00022561–AMNH_ENT 000-22567) (AMNH). 4♀ (AMNH_ENT 000-22393–AMNH_ENT 00022394, AMNH_ENT 00022568–AMNH_ENT 00022569) (MNNC). **Araucania - Region IX:** ***Malleco Prov.:*** Par. Nac. Nahuelbuta, 37.78°S 72.98°W, 1100 m, 19 Nov 1981, R.T. Schuh and N.I. Platnick, 2♂ (AMNH_ENT 00023989), 2♀ (AMNH_ENT 00023989), 11 nymphs (AMNH_ENT 00023989, AMNH_ENT 00023990) (AMNH). **Bio-Bio - Region VIII:** ***Arauco Prov.:*** Lago Lanalhue, 37.9°S 73.3°W, 10 m, 08 Nov 1994, S. Oygur & E. Barrera, 1♂ (AMNH_ENT 00023629) (AMNH). **Los Lagos - Region X:** ***Chiloe Prov.:*** 4 km SE of Rilan at Aquanto, 42.52906°S 73.58348°W, 30 Nov 1981, R.T. Schuh and N.I. Platnick, 8♂ (AMNH_ENT 00023343–AMNH_ENT 00023345, AMNH_ENT 00023937), 7♀ (AMNH_ENT 000-23166, AMNH_ENT 00023346, AMNH_ENT 00023937), 5 nymphs (AMNH_ENT 00023937), 23♂ (AMNH_ENT 00022413–AMNH_ENT 00022435), 16♀ (AMNH_ENT 00022436–AMNH_ENT 00022451) (AMNH). 2♂ (AMNH_ENT 00023804, AMNH_ENT 00023805) (JTPC). 2♀ (AMNH_ENT 00022452, AMNH_ENT 00022453) (MNNC). 2♀ (AMNH_ENT 00022454, AMNH_ENT 00022455) (USNM). Chonchi, 42.61277°S 73.80916°W, 46 m, 02 Dec 1966, J. Solenvicens A., 1♂ (AMNH_ENT 00022400), 1♀ (AMNH_ENT 00022396) (AMNH). Just E of Ancud, 41.87°S 73.83°W, 8 m, 27 Nov 1981, R.T. Schuh and N.I. Platnick, 3♂ (AMNH_ENT 00023938), 3♀ (AMNH_ENT 00023938), 5 nymphs (AMNH_ENT 00023938), 8♂ (AMNH_ENT 00022224–AMNH_ENT 000-22231), 12♀ (AMNH_ENT 00022232–AMNH_ENT 00022243) (AMNH). 1♀ (AMNH_ENT 00023817) (JTPC). near Chepu at mouth of Rio Butalcura, 42.05°S 73.98°W, 4 m, 28 Nov 1981, R.T. Schuh and N.I. Platnick, 5 nymphs (AMNH_ENT 00023935), 10♂ (AMNH_ENT 00022403–AMNH_ENT 00022412), 1♀ (AMNH_ENT 00022402) (AMNH). ***Llanquihue Prov.:*** Maullin, 41.6178°S 73.5983°W, 1 m, 16 Nov 1957, L. E. Peña, 3♂ (AMNH_ENT 00023641–AMNH_ENT 00023643) (CNC). ***Palena Prov.:*** Chaiten, 42.92144°S 72.71462°W, 17 Jan 1986, R.T. Schuh and N.I. Platnick, 2♂ (AMNH_ENT 00023940), 2♀ (AMNH_ENT 00023940), 15 nymphs (AMNH_ENT 00023940), 2♀ (AMNH_ENT 00022222, AMNH_ENT 00022223) (AMNH); 06 Dec 1981, R.T. Schuh and N.I. Platnick, 3♂ (AMNH_ENT 00023165, AMNH_ENT 000-23354, AMNH_ENT 00023942), 4♀ (AMNH_ENT 00023355–AMNH_ENT 000-23357, AMNH_ENT 00023942), 6 nymphs (AMNH_ENT 00023942), 19♂ (AMNH_ENT 00022244–AMNH_ENT 00022262), 31♀ (AMNH_ENT 00022267–AMNH_ENT 000-22297) (AMNH). 5♂ (AMNH_ENT 00023-799–AMNH_ENT 00023803), 6♀ (AMNH_ENT 00023813–AMNH_ENT 00023816, AMNH_ENT 00023818–AMNH_ENT 000-23819) (JTPC). 2♂ (AMNH_ENT 00022263, AMNH_ENT 00022264) (MNNC). 2♂ (AMNH_ENT 00022265, AMNH_ENT 000-22266) (USNM). Chaiten, 42.92144°S 72.71462°W, 8 m, 06 Dec 1981, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 000-23934), 2 nymphs (AMNH_ENT 00023934) (AMNH). ***Valdivia Prov.:*** 15 km S Lenco (55 km NW of Rio Negro), Puelche, 40.0183°S 72.18333°W, 1150 m, 24 Jan 1986, R.T. Schuh, 2♂ (AMNH_ENT 00023939), 2♀ (AMNH_ENT 00023939), 10 nymphs (AMNH_ENT 00023939), 20♂ (AMNH_ENT 00022456–AMNH_ENT 00022475), 19♀ (AMNH_ENT 00022479–AMNH_ENT 00022497) (AMNH). 1♂ (AMNH_ENT 00022476), 1♀ (AMNH_ENT 00022498) (MACN). 2♂ (AMNH_ENT 00022477, AMNH_ENT 00022478), 2♀ (AMNH_ENT 00022499, AMNH_ENT 00022500) (MNNC). Lenco, 39.88333°S 72.18333°W, 150 m, 24 Jan 1986, R.T. Schuh and N.I. Platnick, 2♂ (AMNH_ENT 00022575, AMNH_ENT 00022576), 3♀ (AMNH_ENT 00022577–AMNH_ENT 000-22579) (AMNH). **Magallanes y Antartica Chilena - Region XII:** ***Magallanes Prov.:*** 25 km S Punta Arenas, 53.3569°S 70.97711°W, 1 m, 17 Dec 1981, R. T. Schuh and B. M. Massie, 2♂ (AMNH_ENT 00023349, AMNH_ENT 00023350), 3♀

(AMNH_ENT 00023351–AMNH_ENT 000-23353), 69♂ (AMNH_ENT 00022298–AMNH_ENT 00022340, AMNH_ENT 000-22349–AMNH_ENT 00022354, AMNH_ENT 00022501–AMNH_ENT 00022520), 32♀ (AMNH_ENT 00022521–AMNH_ENT 00022547, AMNH_ENT 00022556–AMNH_ENT 00022560) (AMNH). 5♂ (AMNH_ENT 00023806–AMNH_ENT 00023810), 5♀ (AMNH_ENT 00023820–AMNH_ENT 00023824) (JTPC). 2♂ (AMNH_ENT 00-022341, AMNH_ENT 00022342), 2♀ (AMNH_ENT 00022548, AMNH_ENT 00-022549) (MACN). 2♂ (AMNH_ENT 00-022345, AMNH_ENT 00022346), 2♀ (AMNH_ENT 00022552, AMNH_ENT 00-022553) (MNNC). 2♂ (AMNH_ENT 00-022343, AMNH_ENT 00022344), 2♀ (AMNH_ENT 00022550, AMNH_ENT 00-022551) (IMLA). 2♂ (AMNH_ENT 00-022347, AMNH_ENT 00022348), 2♀ (AMNH_ENT 00022554, AMNH_ENT 000-22555) (USNM); 23 Dec 1981, R. T. Schuh and B. M. Massie, 6♂ (AMNH_ENT 00023941), 6♀ (AMNH_ENT 00023941), 20 nymphs (AMNH_ENT 00023941) (AMNH). Punta Arenas, 53.15°S 70.91666°W, 34 m, 13 Feb 1951, R. Barriento, 1♀ (AMNH_ENT 00022398) (JTPC). ***Tierra del Fuego Prov.:*** Porvenir, 53.3°S 70.3667°W, 13 m, 16 Feb 1988, Daccordi, 1♂ (AMNH_ENT 000-23347) (HEISS). ***Ultima Esperanza Prov.:*** 6 km SE Puerto Natales, 51.75871°S 72.4259°W, 90 m, 18 Dec 1981–20 Dec 1981, R. T. Schuh, B. M. Massie, 7♂ (AMNH_ENT 00023164, AMNH_ENT 00023358–AMNH_ENT 00023359, AMNH_ENT 00023936, AMNH_ENT 00023968), 9♀ (AMNH_ENT 00023936, AMNH_ENT 00023968), 29 nymphs (AMNH_ENT 00023936, AMNH_ENT 000-23968), 5♂ (AMNH_ENT 00022210–AMNH_ENT 00022214), 11♀ (AMNH_ENT 000-22199–AMNH_ENT 00022209) (AMNH). Par Nac Torres del Paine, Lagunade Cisnes, 51.15°S 72.74°W, 220 m, 19 Dec 1981, R. T. Schuh and B. M. Massie, 1♂ (AMNH_ENT 00023969), 2♀ (AMNH_ENT 00023348, AMNH_ENT 00023969), 1♀ (AMNH_ENT 00022217) (AMNH). **Maule - Region VII:** ***Curico Prov.:*** Vegas de Vagara, Rio Teno, 34.98333°S 71.38333°W, 2700 m, 20 Jan 1964, L. E. Peña, 2♀ (AMNH_ENT 00023811, AMNH_ENT 00023812) (JTPC).

Pseudosaldula bruesi (Drake)
Plate 2; figures 1, 8; map 5

Pentacora bruesi Drake, 1949: 187 (n. sp.).
Pentacora amazona Drake, 1955: 154 (n. sp.). NEW SYNONYMY.
Pentacora bucayana Drake, 1955: 157 (n. sp.). NEW SYNONYMY.
Pentacora pillaona: Drake, 1955: 156 (n. sp.). NEW SYNONYMY..
Oreokora amazona: Drake, 1962: 122 (n. comb.).
Oreokora bucayana: Drake, 1962: 122 (n. comb.).
Oreokora pillaona: Drake, 1962: 123 (n. comb.).
Pseudosaldula pilloana: Schuh et al., 1987:316 (cat. [lapsus]).
Pseudosaldua bruesi: Schuh et al., 1987: 315 (n. comb., cat.).

DIAGNOSIS: Macropterous or brachypterous; hemelytra highly polished except apical one-fifth of exocorium, anterior two-thirds of endocorium, and entire clavus dull (area of claval commissure also polished); vestiture of dorsum—including veins of membrane—composed of long, reclining dark simple setae intermixed with recumbent, golden, shining setae. Extensive hemelytral polishing restricted to *P. andensis* and *P. bruesi*, but exocorium entirely polished in *P. andensis*, whereas exocorium with dull area medially along radial vein in *P. bruesi*; membrane in brachypterous specimens of *P. andensis* completely polished and shining, whereas only veins of membrane polished in *P. bruesi*; cells of membrane always coalesced and partially obscured in brachypterous forms of *P. andensis*, whereas all five cells always visible in *P. bruesi*.

REDESCRIPTION: *Male*: Total length 3.71, width pronotum 1.38. COLORATION (pl. 2): Hemelytron ranging from almost entirely dark, with cells sometimes partially transparent, to largely pale with only clavus, extreme base of corium, and a few small markings on corium dark; antennal segments 1 and 2 pale to weakly darkened, segments 3 and 4 more strongly darkened; legs, including coxae, largely pale, apex of foretibia with a contrasting, narrow, brown band. SURFACE AND VESTITURE (pl. 2): Clavus, basal two-thirds of endocorium, and apical one-fifth of exocorium dull, dull areas with some pale, weakly pruinose spots. Vestiture of dorsum—including veins of membrane—composed of moderately

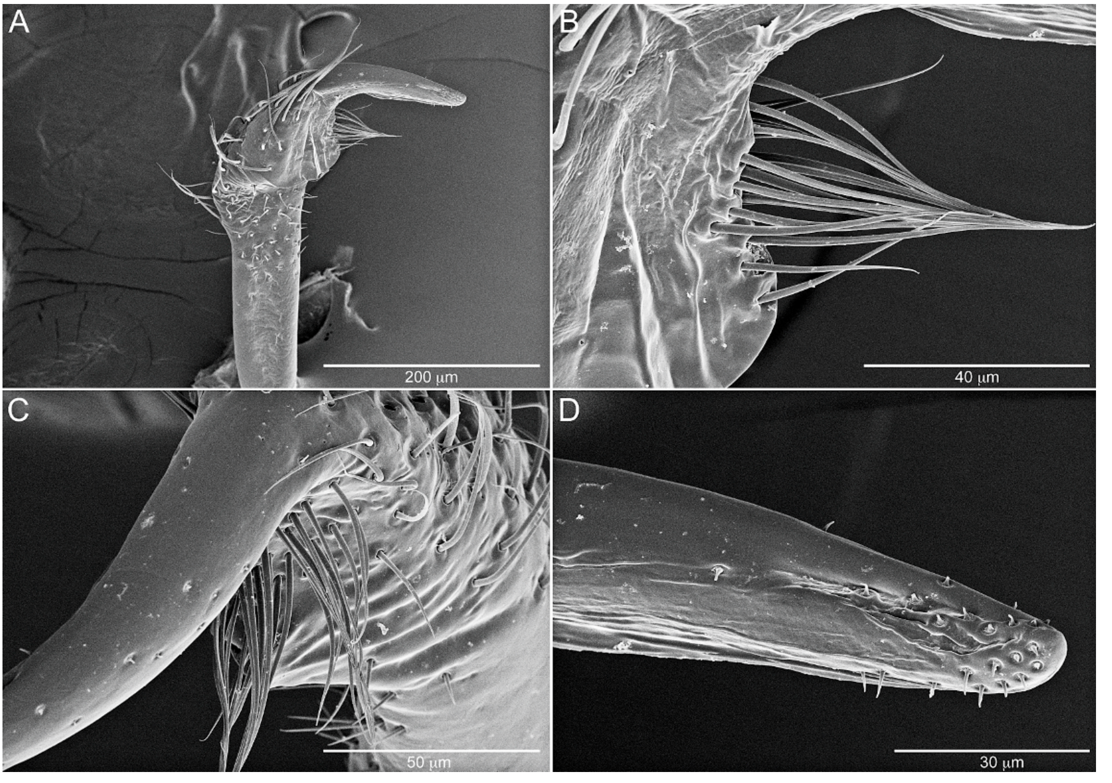


Fig. 8. *Pseudosaldula bruesi* (scanning electron micrographs): Left paramere. **A.** General view of ventral face. **B.** Detail of setae on processus sensualis from ventral face. **C.** Apicodorsal view of setae on processus sensualis. **D.** Apex of paramere showing short setiform sensors.

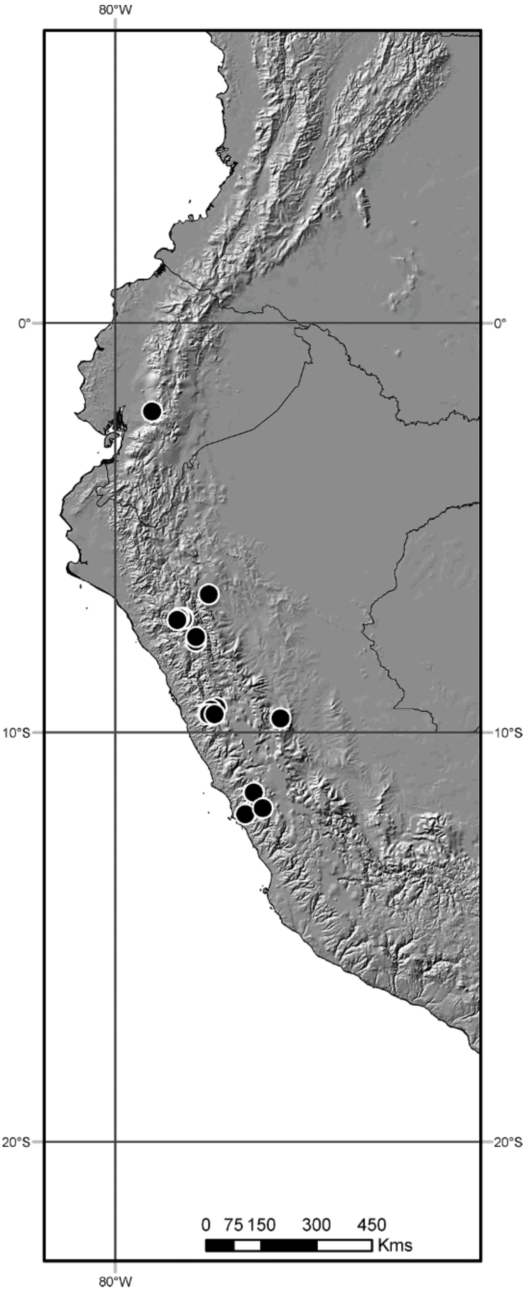
long, reclining, dark simple setae intermixed with recumbent, golden, shining setae. STRUCTURE (pl. 2): Macropterous forms elongate ovoid, brachypterous forms teardrop shaped, broadest at about level of apex of claval commissure in brachypterous forms. **Thorax**: Pronotum with lateral margins weakly to moderately convexly rounded. *Hemelytra*: Membrane of forewing with five distinct cells in both macropterous and brachypterous forms. GENITALIA (figs. 1, 2, 8): **Parandria**: Inner sclerotized margin smoothly rounded; posterior margin weakly curving. **Parameres**: Processus sensualis with 10–15 setae.

Female (pl. 2): Total length 3.97, width pronotum 1.46. COLORATION (pl. 2): As in male; subgenital plate sometimes narrowly transparent apically. SURFACE AND VESTITURE (pl. 2): As in male. STRUCTURE: **Abdomen**: See generic description. GENITALIA: See generic description.

HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between 1750–3540 meters, with the majority of records above 2700 meters. Available habitat data indicate many specimens were collected on relatively permanent substrates, including seeps and the margins of small lakes. Nonetheless, some specimens have been taken on sandy river margins and in wet areas along roadsides.

DISTRIBUTION: Southern Ecuador and northern Peru.

DISCUSSION: Drake (1962) treated *P. bruesi* as a junior synonym of *P. andensis*. Although these two nominal species share many features in common, including those of the parandria, and share partially overlapping distributions, we are treating them as separate because of what we believe to



Map 5. Distribution of *Pseudosaldula bruesi*.

be constant character differences between them, as detailed in the diagnoses and descriptions.

Comparison of the holotypes of *bruesi* Drake, *amazona* Drake, and *pillaona* Drake and many other specimens indicates that the three are synonymous, *bruesi* having priority.

The nominal species *Pentacora bucayana* is known from only two specimens, the macropterous female holotype and a distinctly brachypterous female paratype, both from the same locality. *Pseudosaldula bucayana* is most similar in general appearance to *P. bruesi* by virtue of having the lateral corial margin (embolium) polished and shining. *Pseudosaldula bucayana* appears to have the dorsum clothed with relatively short, dark, reclining, common setae mixed with golden, shining, recumbent setae, although both known specimens of *P. bucayana* are rather badly rubbed. In the known specimens of *P. bucayana* there is no visible pruinosity; in this regard, and the shape of the pronotum, *P. bucayana* has an appearance of *P. bruesi*, and we therefore treat them as synonymous.

HOLOTYPE: submacropterous female, "Metucana, Peru, June–July, 1913, 7300 ft, CT Brues; Gift of C. T. Brues; Holotype *Pentacora bruesi* Drake; M. C. Z. holotype 28266." Deposited in the AMNH.

HOLOTYPES OF SYNONYMS: *Pseudosaldula amazona* (Drake): macropterous male, "Peru, S. A., July 19, 1936, F. Woytkowski; Dept. Amazonas, San Indelfonso, Rio Utcubrmba [sic]; Type *Pentacora amazona* Drake. Deposited in KU. *Pseudosaldula pillaona* (Drake): macropterous female, "Pillao, Peru, Dept. Huanuco, II.16.48, 2700 m, a.s.l., Felix Woytkowski; Type *Pentacora pillaona* Drake." Deposited in KU. *Pentacora bucayana* Drake: macropterous female, "F. X. Williams, Bucay, Ecuador, October 16, 1923; Type *Pentacora bucayana* Drake; deposited in KU.

SPECIMENS EXAMINED: **ECUADOR: Chimborazo:** Bucay, 2.167°S 79.1°W, 603 m, 16 Oct 1923, F. X. Williams, Holotype, 1♀ (SEMC). **PERU: Amazonas:** San Ildelfonso, Rio Utcubamba, 6.6333°S 77.7167°W, 2471 m, 19 Jul 1936, F. Woytkowski, Holotype, 1♂ (SEMC). **Ancash:** 15 km N of Huaraz, 9.3978°S 77.53333°W, 2780 m, 14 Jan 1976, R.T. and J.C. Schuh, 3♀ (AMNH_ENT 00023852–AMNH_ENT 00023854) (JTPC). 70 km E of Casma, 9.44942°S 77.6588°W, 1750 m, 16 Jan 1976, R.T. and

J.C. Schuh, 1♀ (AMNH_ENT 00022719) (AMNH). Blw Punta Callan to W, 9.55651°S 77.72776°W, 2920 m, 16 Jan 1976, R.T. and J.C. Schuh, 2♂ (AMNH_ENT 00020086, AMNH_ENT 00023308), 2♀ (AMNH_ENT 00023310, AMNH_ENT 00023311), 5 nymphs (AMNH_ENT 00023951), 18♂ (AMNH_ENT 00022662–AMNH_ENT 00022679), 28♀ (AMNH_ENT 00022632–AMNH_ENT 00022659) (AMNH). 1♀ (AMNH_ENT 00023850) (JTPC). 2♀ (AMNH_ENT 00022660, AMNH_ENT 00022661) (IMLA). Blw Punta Callan to W, 9.55893°S 77.7098°W, 3540 m, 16 Jan 1976, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00023307), 1♀ (AMNH_ENT 00023309), 3♂ (AMNH_ENT 00022716–AMNH_ENT 00022718) (AMNH). 1♂ (AMNH_ENT 00023847) (JTPC). Btwn Huaraz and Punta Callan, 9.56033°S 77.5729°W, 3440 m, 16 Jan 1976, R.T. and J.C. Schuh, 3♂ (AMNH_ENT 00023844–AMNH_ENT 00023846) (JTPC). **Cajamarca:** 1 km W of Namora, nr Cajamarca, 7.2°S 78.34244°W, 2720 m, 19 Jan 1976, R.T. and J.C. Schuh, 3♂ (AMNH_ENT 00022711–AMNH_ENT 00022713), 2♀ (AMNH_ENT 00022714, AMNH_ENT 00022715) (AMNH). 10 km ESE of Llacanora, near Cajamarca, Laguna Suluscocha, 7.23458°S 78.34918°W, 2850 m, 19 Jan 1976, R.T. and J.C. Schuh, 5♂ (AMNH_ENT 00022706–AMNH_ENT 00022710) (AMNH). 2 km W of Llacanora, nr Cajamarca, 7.20943°S 78.44278°W, 2530 m, 19 Jan 1976, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00022705) (AMNH). above San Juan en route to Cajamarca, 7.25905°S 78.48961°W, 2620 m, 17 Jan 1976, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00022720) (AMNH). **Huanuco:** Pillao, 9.6667°S 75.9667°W, 2700 m, 16 Feb 1948, F. Woytkowski, Holotype, 1♀ (SEMC). **La Libertad:** 20 km NE of Huamachuco, Laguna Cahuadan, 7.78134°S 78.03169°W, 3000 m, 20 Jan 1976, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00023855) (JTPC). 25 km S of Cajabamba, 7.6748°S 78.03022°W, 3000 m, 20 Jan 1976, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00023312) (AMNH). **Lima:** Matucana, 11.852°S 76.4°W, 2225 m, 01 Jul 1913, C. T. Brues, Holotype, 1♀ (AMNH). above Canta, 11.47401°S 76.61874°W, 3000 m, 28 Jan 1976, R.T. Schuh, 1♂ (AMNH_ENT 00023306), 16♂ (AMNH_ENT 00022687–AMNH_ENT 00022702), 6♀ (AMNH_ENT 00022681–AMNH_ENT 00022686) (AMNH). 2♂ (AMNH_ENT 00022703, AMNH_ENT 00022704) (EELM). 2♂ (AMNH_ENT 00023848, AMNH_ENT 00023849), 1♀ (AMNH_ENT 00023851) (JTPC). km 99 Carretera Central E Lima, Rio Rimac, 12.00692°S 76.82817°W, 3300 m, 14 Nov 1971, R.T. and J.C. Schuh, 2♂ (AMNH_ENT 00023301, AMNH_ENT 00023302), 3♀ (AMNH_ENT 00023303–AMNH_ENT 00023305), 28♂ (AMNH_ENT 00022580–AMNH_ENT 00022607), 14♀ (AMNH_ENT 00022614–AMNH_ENT 00022627) (AMNH). 2♂ (AMNH_ENT 00022610, AMNH_ENT 00022611), 2♀ (AMNH_ENT 00022628, AMNH_ENT 00022629) (EELM). 2♂ (AMNH_ENT 00023842, AMNH_ENT 00023843), 3♀ (AMNH_ENT 00023856–AMNH_ENT 00023858) (JTPC). 2♂ (AMNH_ENT 00022612, AMNH_ENT 00022613) (IMLA). 2♂ (AMNH_ENT 00022608, AMNH_ENT 00022609), 2♀ (AMNH_ENT 00022630, AMNH_ENT 00022631) (USNM).

Pseudosaldula chilensis (Blanchard)
Plates 3, 6, 7C–F; figures 1, 2, 9–11; map 6

Acanthia chilensis Blanchard, 1852: 225 (n. sp.).
Acanthia rogeri Kirkaldy, 1899: 92 (n. sp.). NEW SYNONYMY.
Acanthia araucanica Kirkaldy, 1899: 93 (n. sp.). (Syn. by Drake 1962:121).
Pentacora angusta Drake and Carvalho, 1948: 473 (n. sp.). NEW SYNONYMY.
Saldula araucanica: Drake and Carvalho, 1948: 474 (n. comb.).
Saldula rogeri: Drake and Hoberlandt, 1951: 10 (n. comb.).
Pentacora araucanica: Drake, 1955: 152 (n. comb.).
Pentacora regilla Drake, 1955: 155 (n. sp.). NEW SYNONYMY.
Pentacora rogeri: Drake, 1955: 152 (n. comb.).
Pseudosaldula rogeri: Cobben, 1961: 98 (n. comb.).
Oreokora regilla: Drake, 1962: 122 (n. comb.).
Oreokora rogeri: Drake, 1962: 122 (n. comb.).
Oreokora angusta: *Drake*, 1962: 122 (n. comb.).
Pseudosaldula chilensis: Schuh et al., 1987: 315 (n. comb., cat.).

DIAGNOSIS: Macropterous or submacropterous; recognized by the contrasting black stripe on at least fore- and middle tibiae, the two black stripes on antennal segment 1, and

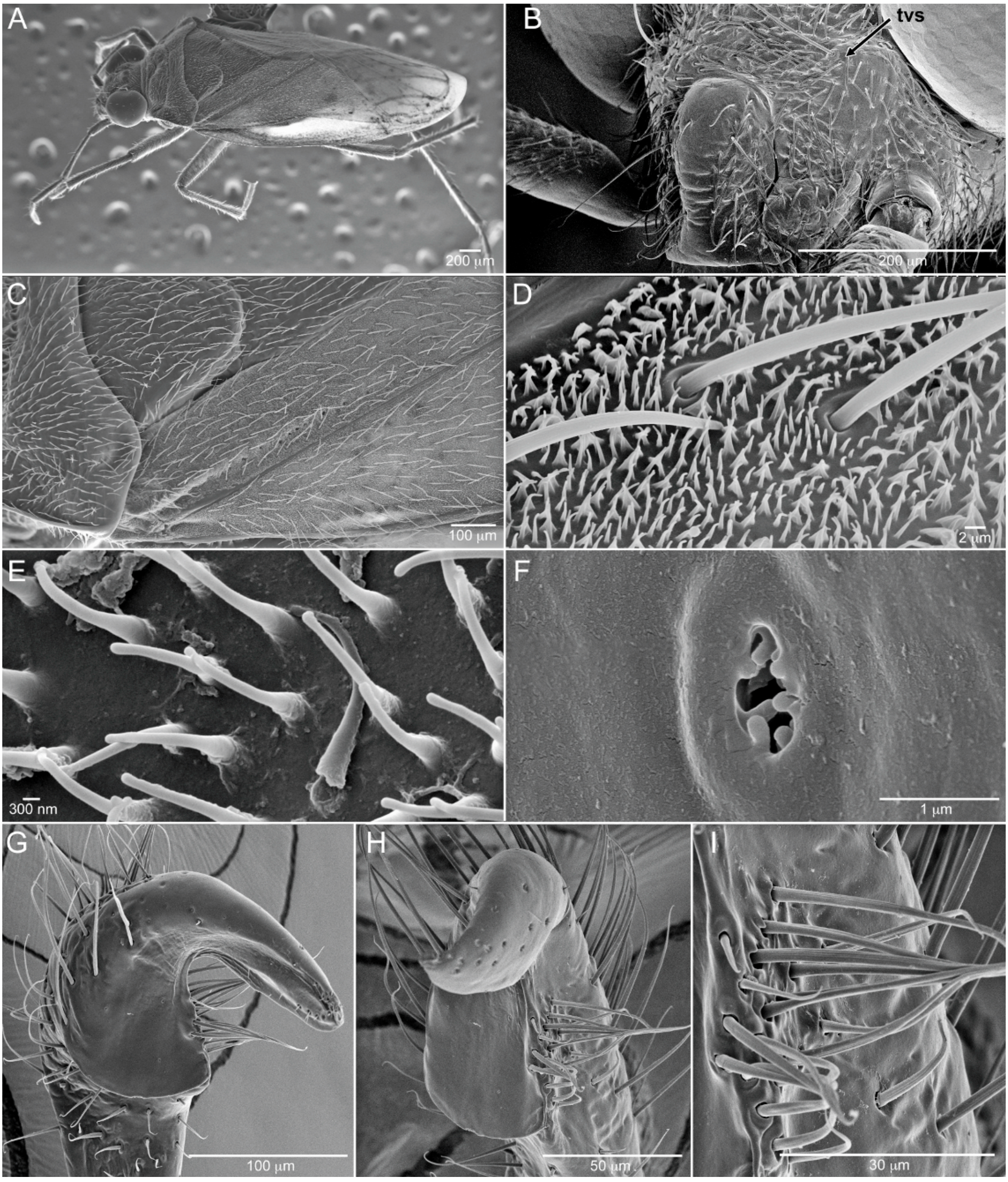


Fig. 9. *Pseudosaldula chilensis* (scanning electron micrographs). **A.** Lateral view whole specimen. **B.** Frontolateral view of face showing structure of transverse swelling across base of clypeus. **C.** Dorsal view of pronotum, scutellum, and base of hemelytra showing setae on dorsum and contrast between polished pronotum and scutellum and dull hemelytron covered with microtrichia. **D.** Detail of clavus showing common setae and microtrichia. **E.** Close-up view of microtrichia in 15D. **F.** Gland pore on paramere. **G.** Ventrolateral view of apical third of left paramere. **H.** Lateral view of apical region of paramere, including processus sensualis. **I.** Detail view of setae on processus sensualis. **tvs,** transverse swelling.

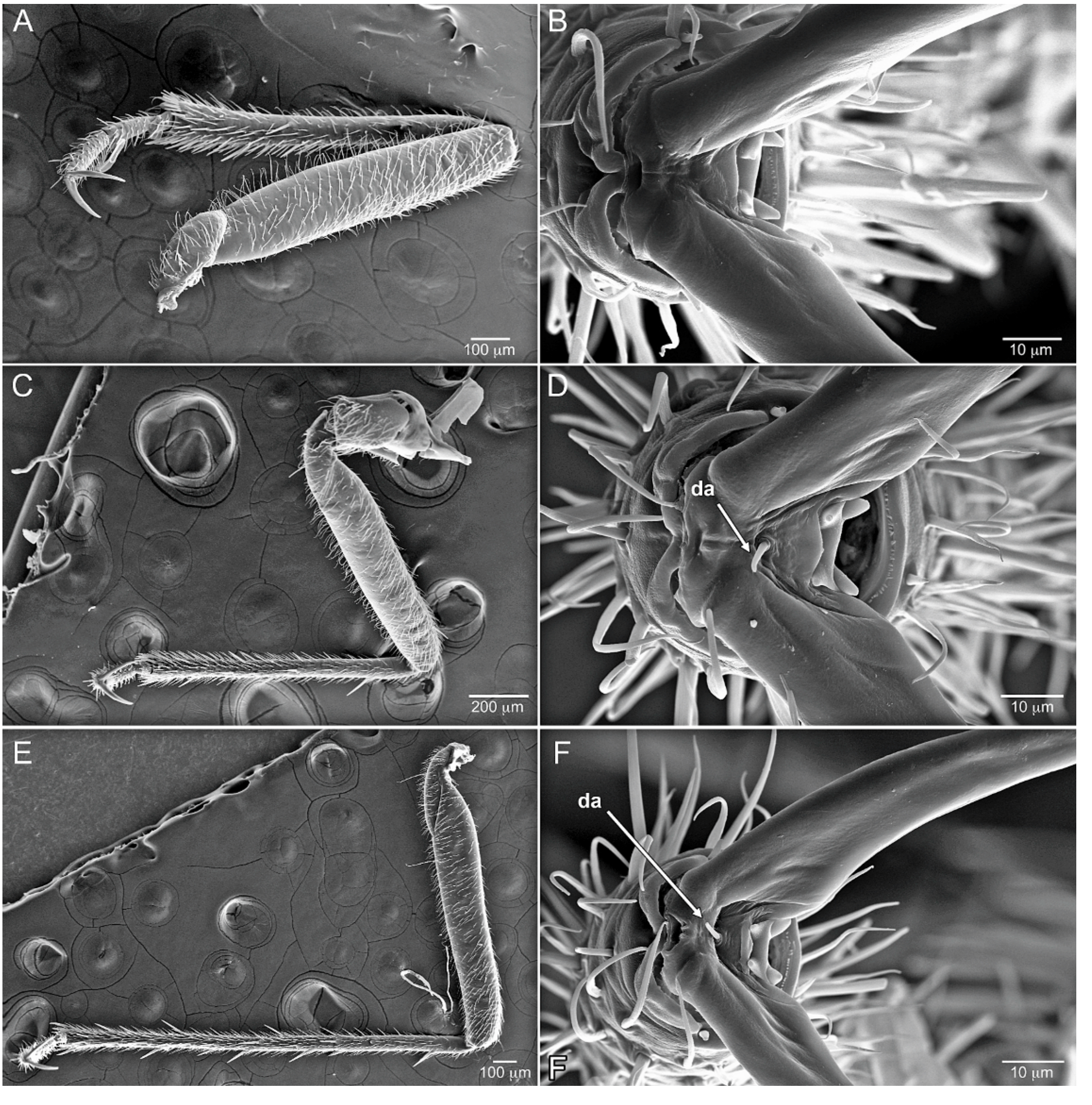


Fig. 10. *Pseudosaldula chilensis*, adult (scanning electron micrographs). **A.** Foreleg, showing small number of spines and distal antennal cleaner on tibia. **B.** Detail of pretarsus of foreleg showing reduced parempodia and absence of dorsal arolium. **C.** Middle leg, showing moderate number of spines on tibia. **D.** Detail of pretarsus of middle leg showing reduced parempodia and presence of dorsal arolium. **E.** Hind leg, showing large number of spines on tibia. **F.** Detail of pretarsus on hind leg showing reduced parempodia and presence of dorsal arolium. **da,** dorsal arolium.

the hemelytra uniformly dull with appressed golden setae and short recumbent black setae. Black stripe lateroventrally on antennal segment 1 similar to condition found in *P. penai* and *P. salina*, but *P. chilensis* differing from those species by the presence of a black stripe also dorsomedially on antennal segment 1, and further differing from *P. salina* by that species having only short black setae on the dorsum. The short vestiture and dull surface of hemelytra similar to condition found in *P. bergi* and *P. vulgaris*, but shining golden setae virtually absent on hemelytra in *P. bergi*. Dorsum in

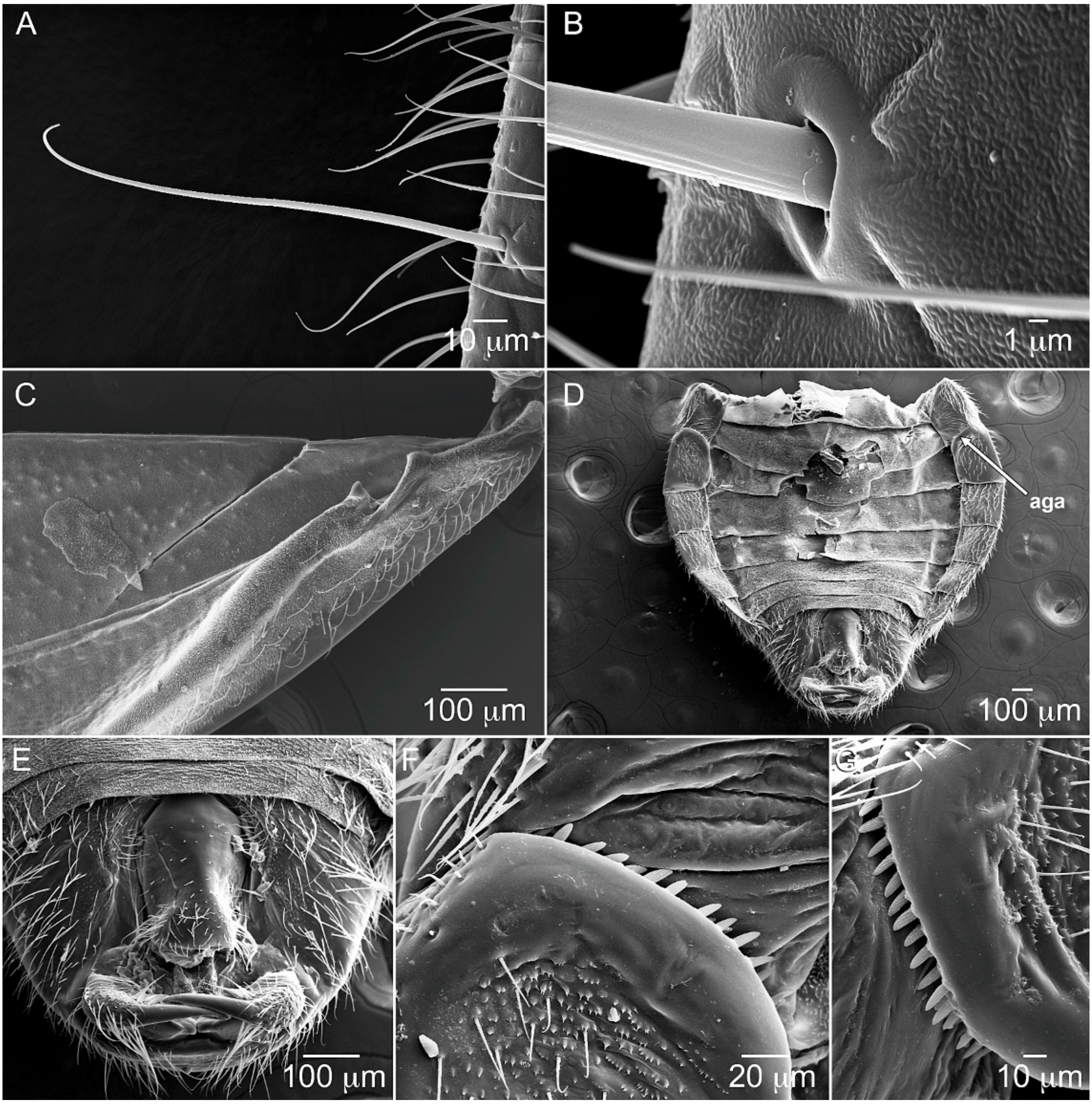
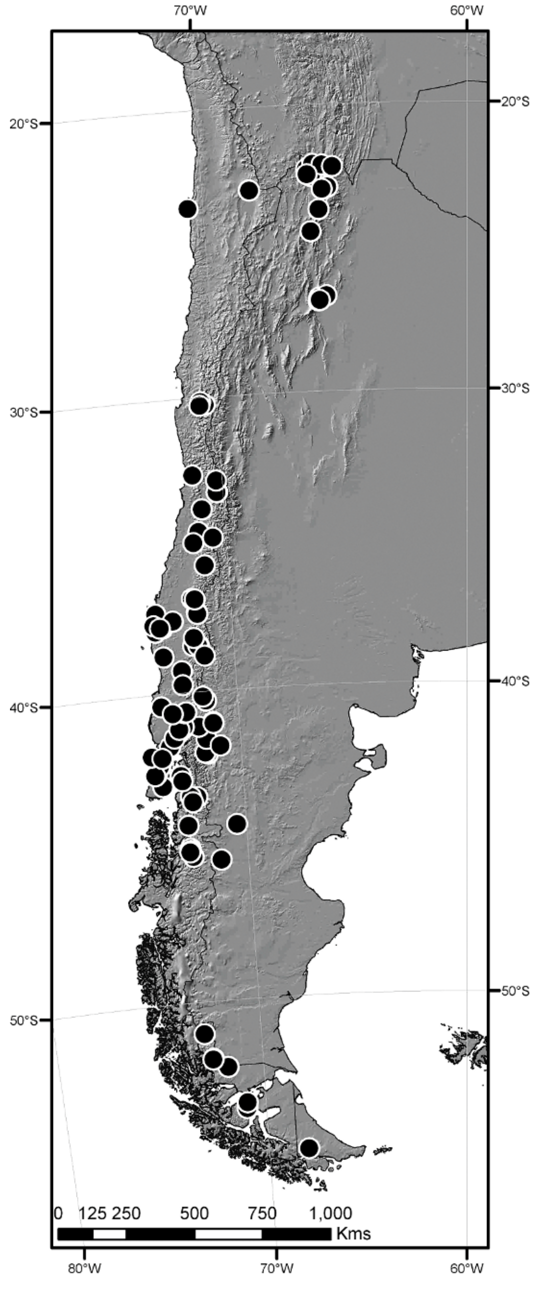


Fig. 11. *Pseudosaldula chilensis* (scanning electron micrographs). **A.** Elongate seta on ventral surface of hind femur. **B.** Detail of base of elongate seta on ventral surface of hind femur. **C.** Ventral view of base of right forewing showing hypocostal ridge and wing coupling mechanism. **D.** Dorsal view of abdomen of male. **E.** Doral view of pygophore (detail) showing parameres in repose. **F.** Abdominal grasping organ in male, left side. **G.** Abdominal grasping organ in male, right side. aga, abdominal grasping apparatus.

P. pilosa entirely dull, but almost exclusively with long, erect, shaggy setae in contrast to *P. chilensis*.

Redescription: *Male*: Total length 3.50, width pronotum 1.33. COLORATION (pl. 3): Hemelytron largely dark, with cells of membrane and some areas of corium weakly pale; exocorium frequently with a yellow-white quadrate maculation subbasally and less frequently with a distinct pale macula subapically; antennal segment 1 pale laterally and medially, black dorsally and ventrally, segments 2–4 black or nearly so; coxae largely dark, femora and tibiae pale laterally, femora dark on dorsal surface, tibiae dark on dorsal surface; apex of



Map 6. Distribution of *Pseudosaldula chilensis*.

foretibia with a contrasting, dark, narrow band. SURFACE AND VESTITURE (pl. 3; fig. 9C–E): Hemelytron dull except narrowly along claval commissure, with several distinct pruinose spots. Vestiture of dorsum composed of dull, reclining, dark, relatively short, simple setae intermixed with numerous golden, shining setae; most veins of membrane devoid of setae. STRUCTURE (figs. 9–11): Known from macropterous and submacropterous forms, body in most specimens elongate ovoid, broadest at midpoint. **Thorax**: Pronotum with lateral margins nearly straight, distinctly angled anteriorly. *Hemelytra*: Membrane of forewing always with five fully-formed cells. GENITALIA (figs. 1, 2, 9G–I, 11E) **Parandria**: Inner sclerotized margin straight, angled posterolaterally; posterior margin elongate, angled laterally, convex medially. **Parameres**: Processus sensualis with 10–15 setae.

Female (pl. 3): Total length 4.11, width pronotum 1.57. COLORATION (pl. 3): As in male; apex of subgenital plate usually broadly pale. SURFACE AND VESTITURE (pl. 3; 9C–E): As in male. STRUCTURE: **Abdomen**: See generic description. GENITALIA: See generic description.

HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between 4–3900 meters, with the majority of records at elevations below 500 meters in south central and southern Chile. Available habitat data indicate specimens were collected in more temporary habitats than is the case for most other *Pseudosaldula* spp., including the margins of roads and highways, mud, sand, and gravel stream and lake margins. Most of these environments included vegetative cover of no more than 30%, although a few collection localities involved the occurrence of *P. chilensis* on seeps, which had vegetative cover and usually represent a more stable and permanent environment.

DISTRIBUTION: Jujuy Province in northern Argentina, south throughout Chile to the eastern tip of Tierra del Fuego, with a few records available from the eastern Andean foothills in Patagonian Argentina.

DISCUSSION: This is the most widespread and most commonly collected species of *Pseudosaldula*, possibly in part because it occupies a rather broad range of habitats and is one of the few species that occurs in relatively temporary or periodically disturbed habitats. This adaptability agrees with the fact that all of the more than 1000 specimens we have examined are either macropterous or submacropterous, in contrast to most—although not all—of the other species. Furthermore, the wide distribution of this species has resulted in its capture by general collectors to a much greater degree than the other species. Thus, even though this species shows very little variation in degree of pigmentation of the hemelytra (pl. 3) compared to most other species of *Pseudosaldula*, its widespread occurrence probably also accounts for the rather large number of junior synonyms associated with the name *chilensis*.

We have examined the macropterous male holotype of *Acanthia chilensis* Blanchard, deposited in the Natural History Museum, Paris.

Kirkaldy (1899) noted that specimens of *rogeri* were deposited in his collection and that of the Perth Museum, indicating that he saw more than one specimen. Cobben (1961) designated a lectotype for *Acanthia rogeri* Kirkaldy; it is deposited in The Natural History Museum, London. Cobben compared this specimen with a specimen labeled as the "type" of *Acanthia araucanica* Kirkaldy, and concluded that the two were synonymous. However, he did not believe that the specimen labeled as *araucanica* was actually one of those examined by Kirkaldy, based on his reading of Kirkaldy's original description. Because the BM specimen bears the label "*Acanthia araucanica* Kirk. TYPE" in what we judge to be Kirkaldy's handwriting, and because we have been able to find no other specimens that appear to pertain to *araucanica*, we are treating it as the type, as indicated below. We agree with Cobben that *araucanica* and *rogeri* are synonyms and that both are junior synonyms of *chilensis*, the synonymy of *araucanica* and *chilensis* also being in accordance with the observations of Drake (1962).

Further comparison of the types of *regilla* Drake and *angusta* Drake indicates that both are synonymous with the concept of *chilensis* that we have defined above.

HOLOTYPE: Female: "Museum Paris. Chili Gay. 15–43." "Type." "Lectotype *Acanthia chilensis* Blanch." "*Acanthia chilensis* Bl. Type." Deposited in the National Museum of Natural History, Paris.

TYPES OF SYNONYMS: Lectotype *Acanthia araucanica* Kirkaldy: macropterous female, "Type; Mendosa, Reed, 1870; Pres. by Perth Museum. B.M. 1953-629; *Acanthia araucanica* Kirk. TYPE; *Pseudosaldula rogeri* (Kirk.), det. R. H. Cobben 1961.; *Acanthia araucanica* Kirkaldy, LECTOTYPE, det. R. T. Schuh and J. T. Polhemus." Deposited in the BMNH. *Pentacora regilla* Drake: ? macropterous male, "Puerto Puyuhuapi, Süd-Chile, leg. H. Schwabe; W 31 unten, 23.12.37; Type *Pentacora regilla* Drake; C. J. Drake Coll. 1956." Deposited in the USNM. Lectotype *Acanthia rogeri* Kirkaldy: macropterous female, "Chile, Reed; Pres. by Perth Museum. B.M. 1953-629; *Acanthia rogeri* Kirk. 1899 TYPE; Lectotype *Pseudosaldula rogeri* (Kirk.) R. H. Cobben 1961." Deposited in the BMNH. *Pentacora angusta* Drake: macropterous male, "Rio Negro, Argentina; C. J. Drake Coll. 1956; Holotype Drake." Deposited in the USNM.

SPECIMENS EXAMINED: **ARGENTINA: Catamarca:** La Banderita, 22 Nov 1951, N. Kormilev, 1♀ (AMNH_ENT 00023869) (MACN). **Chubut:** 108 km W of Rio Mayo, 45.56°S 71.26°W, 720 m, 21 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00020893) (AMNH). El Hoyo, 42.08°S 71.49°W, 230 m, 24 Apr 1963, A. Kovacs, 1♀ (AMNH_ENT 00021170) (AMNH). N shore of Lago Puela, 42.04°S 71.59°W, 160 m, 15 Jan 1986, R.T. Schuh and N.I. Platnick, 3♂ (AMNH_ENT 00023930), 3 nymphs (AMNH_ENT 00023930), 12♂ (AMNH_ENT 00020669–AMNH_ENT 00020680), 8♀ (AMNH_ENT 00020681, AMNH_ENT 00020684–AMNH_ENT 00020690) (AMNH). 2♀ (AMNH_ENT 00020682, AMNH_ENT 00020683) (EELM). **Jujuy:** 12 km NE of Iturbe, 22.91°S 65.27°W, 1670 m, 15 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♀ (AMNH_ENT 00023605) (AMNH). 15 km NW of Abra Pampa, 22.51666°S 65.86666°W, 3920 m, 14 Feb 1993, R. T. Schuh, J. T. Polhemus, 1♀ (AMNH_ENT 00020897) (AMNH). 16 km S of Tres Cruces, 22.97666°S 65.479°W, 3580 m, 11 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♀ (AMNH_ENT 00020896) (AMNH). 20 km S of Yoscaba, stream flowing into Lago Pozuelos, 22.26666°S 66.03333°W, 3710 m, 14 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♀ (AMNH_ENT 00020874) (AMNH). 7 km E of Cienaguillas, betw LaQuica/Cienaguillas, 22.1°S 65.8°W, 3750 m, 14 Feb 1993, R.T. Schuh, J.T.

Polhemus, E. Dominguez, 1♀ (AMNH_ENT 00020900) (AMNH). 9 km E of Iturbe, 22.21666°S 65.16666°W, 3460 m, 15 Feb 1993, R. T. Schuh, J. T. Polhemus, 4♂ (AMNH_ENT 00023297–AMNH_ENT 00023300), 2♂ (AMNH_ENT 00020882, AMNH_ENT 00020883), 4♀ (AMNH_ENT 00020878–AMNH_ENT 00020881) (AMNH). 1♀ (AMNH_ENT 00020876) (IMLA). Cienaga Grande, near S end of Lago Pozuelos, 22.45°S 66.01666°W, 3740 m, 14 Feb 1993, R. T. Schuh and J. T. Polhemus, 1♀ (AMNH_ENT 00020895) (AMNH). Cuesta de Lipan, 28 km W of Parmamarca on Rt 52, 23.6815°S 65.62666°W, 3825 m, 16 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♀ (AMNH_ENT 00020898) (AMNH). along river just N of Yavi, 22.13333°S 65.45°W, 3500 m, 13 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♀ (AMNH_ENT 00020873) (AMNH). **Neuquen:** 51 km S of San Martin de los Andes, 44.45°S 70.43°W, 800 m, 12 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023911), 1♀ (AMNH_ENT 00023911), 10♂ (AMNH_ENT 00020725–AMNH_ENT 00020728, AMNH_ENT 00020731–AMNH_ENT 00020736), 6♀ (AMNH_ENT 00020729–AMNH_ENT 00020730, AMNH_ENT 00020737–AMNH_ENT 00020740) (AMNH). 53 km S of San Martin de los Andes, Rio Pichi Traful, 40.32°S 71.38°W, 790 m, 12 Jan 1986, R.T. Schuh and N.I. Platnick, 1♀ (AMNH_ENT 00023979), 25♂ (AMNH_ENT 00020691–AMNH_ENT 00020715), 1♀ (AMNH_ENT 00020716) (AMNH). 4♀ (AMNH_ENT 00020717–AMNH_ENT 00020720) (MACN). 4♀ (AMNH_ENT 00020721–AMNH_ENT 00020724) (IMLA). Lago Lacar, Pucara, 40.18333°S 71.5°W, 1100 m, 09 Jan 1954, N. Kormilev, 1♀ (AMNH_ENT 00023863) (USNM). Nahuel Huapi, 41.05°S 71.15°W, 880 m, 11 Jan 1986, R.T. Schuh and N.I. Platnick, 2♂ (AMNH_ENT 00020889, AMNH_ENT 00020890), 1♀ (AMNH_ENT 00020891) (AMNH). 2♂ (AMNH_ENT 00020887, AMNH_ENT 00020888) (IMLA). **Rio Negro:** 47 km N of El Bolson, Rio Villegos, 41.59°S 71.5°W, 640 m, 15 Jan 1986, R.T. Schuh and N.I. Platnick, 6♂ (AMNH_ENT 00020786–AMNH_ENT 00020791) (AMNH). 1♂ (AMNH_ENT 00020792), 3♀ (AMNH_ENT 00020793–AMNH_ENT 00020795) (MACN). Black Glacier, El Tronador, 41.17°S 71.79°W, 914 m, 05 Apr 1974, M.S. Polhemus, 2♂ (AMNH_ENT 00023318, AMNH_ENT 00023319), 2♀ (AMNH_ENT 00023320, AMNH_ENT 00023321), 1♂ (AMNH_ENT 00021168) (JTPC). Lago Nahuel Huapi, Brazo Blest, 41.09°S 71.14°W, 640 m, 04 Apr 1974, M.S. Polhemus, 2♂ (AMNH_ENT 00021164, AMNH_ENT 00021165), 2♀ (AMNH_ENT 00021166, AMNH_ENT 00021167) (JTPC). Norquinco, 41.85°S 70.9°W, 900 m, 23 Dec 1963, A. Kovacs, 2♂ (AMNH_ENT 00021171, AMNH_ENT 00021172) (AMNH). unknown, 01 Jan 1900, Unknown, Paratype of Junior Synonym, 1♂ (AMNH_ENT 00023861), 1♀ (AMNH_ENT 00023862) (USNM). **Salta:** 17 km W of Santa Victoria, 22.2°S 65.06°W, 3488 m, 13 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 4♂ (AMNH_ENT 00023293–AMNH_ENT 00023296), 1♂ (AMNH_ENT 00020884), 2♀ (AMNH_ENT 00020885, AMNH_ENT 00020886) (AMNH). just NW of Santa Rosa de Tastil on Rt 51, 24.4415°S 65.96683°W, 3215 m, 18 Feb 1993, R. T. Schuh and J. T. Polhemus, 1♀ (AMNH_ENT 00020899) (AMNH). **Tierra del Fuego:** Lago Fagnano, 54.63333°S 68°W, 200 m, 23 Jan 1962, S. Coscaron, 1♂ (AMNH_ENT 00023644), 1♀ (AMNH_ENT 00023645) (SEMC). **Tucuman:** 16 km W of Tafi del Valle on Rt 307, 26.7685°S 65.73083°W, 2900 m, 21 Feb 1993, R. T. Schuh and J. T. Polhemus, 3♂ (AMNH_ENT 00023924), 1♀ (AMNH_ENT 00023924), 1 nymph (AMNH_ENT 00023924), 5♂ (AMNH_ENT 00020863–AMNH_ENT 00020864, AMNH_ENT 00020866–AMNH_ENT 00020868), 3♀ (AMNH_ENT 00020869–AMNH_ENT 00020871) (AMNH). 2♂ (AMNH_ENT 00020861, AMNH_ENT 00020862) (IMLA). 8 km W of Tafi del Valle, 26.87°S 65.77°W, 2500 m, 03 Jan 1982, R. T. Schuh and B. M. Massie, 9♂ (AMNH_ENT 00023314–AMNH_ENT 00023315, AMNH_ENT 00023466–AMNH_ENT 00023471, AMNH_ENT 00023945), 6♀ (AMNH_ENT 00023316–AMNH_ENT 00023317, AMNH_ENT 00023472, AMNH_ENT 00023945), 1 nymph (AMNH_ENT 00023945) (AMNH). 1♂ (AMNH_ENT 00023669), 2♀ (AMNH_

ENT 00023678, AMNH_ENT 00023679) (JTPC). Siambon, 26.7°S 65.45°W, 1313 m, 01 Jul 1935, J.M. Bosq, 1♂ (AMNH_ENT 00023867) (MLPA). Tafí del Valle, 26.85464°S 65.71341°W, 2000 m, 01 Oct 1957, Unknown, 1♀ (AMNH_ENT 000-23322) (IMLA). **CHILE: Aisen del Gen. Carlos Ibanez del Campo - Region XI:** ***Aisen Prov.:*** Puerto Puyuhuapi, 44.38°S 72.62°W, 160 m, 23 Dec 1937, H. Schwabe, Paratype of Junior Synonym, 1♂ (AMNH_ENT 00023859), 1♀ (AMNH_ENT 00023860) (USNM). Reserva Nac Rio Simpson, Rio Simpson btwn Coyhaique and Aisen, 45.4°S 72.53°W, 20 m, 20 Jan 1986, R.T. Schuh and N.I. Platnick, 4♂ (AMNH_ENT 00023909), 4♀ (AMNH_ENT 00023909), 3 nymphs (AMNH_ENT 00023909), 31♂ (AMNH_ENT 00020631–AMNH_ENT 00020636, AMNH_ENT 00020640–AMNH_ENT 000-20664), 26♀ (AMNH_ENT 00020602–AMNH_ENT 00020627) (AMNH). 3♂ (AMNH_ENT 00020637–AMNH_ENT 000-20639), 3♀ (AMNH_ENT 00020628–AMNH_ENT 00020630) (MNNC). 2♂ (AMNH_ENT 00020665, AMNH_ENT 000-20666) (USNM). 82 km S of Puyuguape, 45.13°S 72.62°W, 260 m, 19 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023929), 1♀ (AMNH_ENT 00023929), 8 nymphs (AMNH_ENT 00023929), 11♂ (AMNH_ENT 00020824–AMNH_ENT 000-20834), 3♀ (AMNH_ENT 00020821–AMNH_ENT 00020823) (AMNH). 89 km S of Puyuguape, 45.21°S 72.62°W, 220 m, 19 Jan 1986,R.T. Schuh and N.I. Platnick, 2♂ (AMNH_ENT 00023910), 2♀ (AMNH_ENT 00023910), 6 nymphs (AMNH_ENT 000-23910), 12♂ (AMNH_ENT 00020741–AMNH_ENT 00020752), 14♀ (AMNH_ENT 00020753–AMNH_ENT 00020766) (AMNH). 97 km S of Puyuguape, Lago de los Torres, 45.25°S 72.65°W, 190 m, 19 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023933), 1 nymph (AMNH_ENT 00023933), 2♂ (AMNH_ENT 00020843, AMNH_ENT 00020844), 3♀ (AMNH_ENT 00020840–AMNH_ENT 00020842) (AMNH). **Antofagasta - Region II:** ***Antofagasta Prov.:*** San Pedro (de) Atacama, Rio Valama, 22.91°S 68.22°W, 2300 m, 01 Apr 1969, L. E. Peña, 4♀ (AMNH_ENT 00023710, AMNH_ENT 00023722–AMNH_ENT 00023724), 3♂ (AMNH_ENT 00021-160–AMNH_ENT 00021162), 1♀ (AMNH_ENT 00021163) (JTPC). San Pedro Atacama, Rio Valama, 22.9167°S 68.2167°W, 2300 m, 01 Apr 1968, L. E. Peña, 3♂ (AMNH_ENT 00023698–AMNH_ENT 00023700) (JTPC). Valle El Yeso, 23.41666°S 70.58333°W, 2200 m, 05 Sep 1900, L. E. Peña, 2♀ (AMNH_ENT 00021153, AMNH_ENT 00021154) (JTPC). **Araucania - Region IX:** ***Cautin Prov.:*** 11.3 km E of Carahue, Rio Imperial, 38.76666°S 73.05°W, 90 m, 11 Nov 1994, S. Oygur & E. Barrera, 4♂ (AMNH_ENT 00023545–AMNH_ENT 00023548) (AMNH). Lago Villarica at Villarica, 34.62°S 71.14°W, 180 m, 30 Jan 1986, R.T. Schuh and N.I. Platnick, 1♀ (AMNH_ENT 00020894) (AMNH). ***Malleco Prov.:*** 17 km E of Curacautin, 38.46°S 71.74°W, 750 m, 22 Nov 1981, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023918), 1♀ (AMNH_ENT 00023337), 10♂ (AMNH_ENT 00021280–AMNH_ENT 00021289), 2♀ (AMNH_ENT 00021290, AMNH_ENT 00021291) (AMNH). 5 km E of Curacautin, Puente Blanco, 38.46666°S 71.5°W, 700 m, 09 Nov 1994, S. Oygur and E. Barrera, 5♂ (AMNH_ENT 00023622–AMNH_ENT 00023626) (AMNH). 9 km E of Manzanar, 38.46666°S 71.53333°W, 1250 m, 09 Nov 1994, S. Oygur and E. Barrera, 1♂ (AMNH_ENT 00023606), 2♀ (AMNH_ENT 00023607, AMNH_ENT 00023608) (AMNH). 9.5 E Malalcahuello, 39.28°S 72.31°W, 1190 m, 30 Nov 1982, A. Newton and M. Thayer, 2♂ (AMNH_ENT 00020818, AMNH_ENT 00020819), 1♀ (AMNH_ENT 00020820) (AMNH). Lago Icalma, 38.8167°S 71.2833°W, 1181 m, 02 Jan 1968, L. E. Peña, 2♂ (AMNH_ENT 00023649, AMNH_ENT 000-23650), 3♀ (AMNH_ENT 00023651–AMNH_ENT 00023653) (MNNC). Par. Nac. Nahuelbuta, 37.78°S 72.98°W, 1100 m, 19 Nov 1981, R.T. Schuh and N.I. Platnick, 4♂ (AMNH_ENT 00023991), 3♀ (AMNH_ENT 00023991), 11 nymphs (AMNH_ENT 00023991, AMNH_ENT 00023992), 9♂ (AMNH_ENT 00021059–AMNH_ENT 00021067), 9♀ (AMNH_ENT 00021050–AMNH_ENT 00021058) (AMNH); 18 Nov 1981, T. Cekalovic, 4♂ (AMNH_ENT 00021130–AMNH_ENT 00021133), 1♀ (AMNH_ENT 00021129) (AMNH). Tolhuaca, 38.2°S 71.68°W, 1400 m, 09 Jan 1962, R. Usinger, 1♂ (AMNH_ENT 00020668) (UCR). **Bio-**

Bio - Region VIII: ***Arauco Prov.:*** 69.6 km S of San Pedro, Puente Ramadillas, Rio Carampangue, 37.3°S 73.23333°W, 5 m, 07 Nov 1994, S. Oygur and E. Barrera, 1♂ (AMNH_ENT 00023618) (AMNH). Caramavida, Nahuelbuta Mt., 37.68171°S 73.35204°W, 220 m, 31 Jan 1967, L. E. Peña, 1♀ (AMNH_ENT 00023686), 2♂ (AMNH_ENT 00021073, AMNH_ENT 00021074), 2♀ (AMNH_ENT 00021075, AMNH_ENT 00021076) (JTPC). Lago Lanalhue, 37.9°S 73.3°W, 10 m, 08 Nov 1994, S. Oygur and E. Barrera, 2♂ (AMNH_ENT 00023590, AMNH_ENT 00023591), 3♀ (AMNH_ENT 00023592–AMNH_ENT 00023594) (AMNH). Nahualbuta Mt., Caramavida, 37.6833°S 73.35°W, 220 m, 31 Jan 1967, L. E. Peña, 4♂ (AMNH_ENT 00023687–AMNH_ENT 00023690) (JTPC). Parque Nacional Nahualbuta, 37.78°S 73.1°W, 1100 m, 19 Nov 1981, R.T. Schuh and N.I. Platnick, 1♀ (AMNH_ENT 00023335) (AMNH). 2♂ (AMNH_ENT 00023656, AMNH_ENT 00023657), 1♀ (AMNH_ENT 00023676) (JTPC). ***Biobio Prov.:*** 4 km E of El Abanico, 37.33°S 71.47°W, 938 m, 21 Nov 1981, R.T. Schuh and N.I. Platnick, 3♂ (AMNH_ENT 00020961–AMNH_ENT 00020963) (AMNH). 4 km E of El Abanico, 37.33°S 71.47°W, 950 m, 21 Nov 1981, R.T. Schuh and N.I. Platnick, 2♂ (AMNH_ENT 00023914), 2♀ (AMNH_ENT 00023914), 1 nymph (AMNH_ENT 00023914), 10♂ (AMNH_ENT 00020952–AMNH_ENT 00020958, AMNH_ENT 00021389–AMNH_ENT 00021391), 13♀ (AMNH_ENT 00020943–AMNH_ENT 00020951, AMNH_ENT 00021385–AMNH_ENT 00021388) (AMNH). 1♂ (AMNH_ENT 00023665), 1♀ (AMNH_ENT 00023677) (JTPC). 5 km E of El Abanico, 37.4°S 71.45°W, 1000 m, 21 Nov 1981, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023943), 2♀ (AMNH_ENT 00023943), 5 nymphs (AMNH_ENT 00023943), 8♂ (AMNH_ENT 00021377–AMNH_ENT 00021384), 6♀ (AMNH_ENT 00021371–AMNH_ENT 00021376) (AMNH). Negrete, 37.58°S 72.52°W, 75 m, 29 Jan 1951, Ross and Michelbacher, 1♀ (AMNH_ENT 00023709), 1♀ (AMNH_ENT 00021101) (JTPC). ***Nuble Prov.:*** Las Trancas, 8 km W of Termas de Chillan, 36.87°S 71.62°W, 1300 m, 15 Nov 1981, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023927), 1♂ (AMNH_ENT 00020964), 1♀ (AMNH_ENT 00020965) (AMNH). Termas de Chillan, 36.9°S 71.52°W, 1800 m, 14 Nov 1981, R.T. Schuh and N.I. Platnick, 5♂ (AMNH_ENT 00023465, AMNH_ENT 00023913), 4♀ (AMNH_ENT 00023913), 10 nymphs (AMNH_ENT 00023913), 14♂ (AMNH_ENT 00021256–AMNH_ENT 00021269), 10♀ (AMNH_ENT 00021270–AMNH_ENT 00021279) (AMNH). 1♂ (AMNH_ENT 00023658) (JTPC). **Coquimbo - Region IV:** ***Elqui Prov.:*** 3 km SE of Alcohuaz, Comunidad Estancia, 30.26472°S 70.48333°W, 1823 m, 24 Oct 1994, S. Oygur and E. Barrera, 1♂ (AMNH_ENT 00023609), 3♀ (AMNH_ENT 00023562–AMNH_ENT 00023563, AMNH_ENT 00023610) (AMNH). Las Hedionditas, 10 Jan 1966, L. E. Peña, 1♂ (AMNH_ENT 00021151) (JTPC). ***Limari Prov.:*** 23 km SE of Hurtado, Rio Hurtado, 30.15666°S 70.65°W, 1620 m, 27 Oct 1994, S. Oygur and E. Barrera, 6♂ (AMNH_ENT 00023549–AMNH_ENT 00023554), 5♀ (AMNH_ENT 00023556–AMNH_ENT 00023560) (AMNH). 6 km SW of Hurtado, Puento Morillos on Rio Hurtado, 30.28333°S 70.7°W, 1040 m, 28 Oct 1994, S. Oygur and E. Barrera, 1♀ (AMNH_ENT 00023561) (AMNH). **Libertador General Bernardo O'Higgins - Region VI:** ***Colchagua Prov.:*** Camino Termas del Flaco (Del Flaco Hot Springs), 34.85°S 70.55°W, 1850 m, 24 Nov 1969, L. E. Peña, 1♂ (AMNH_ENT 00021152) (JTPC). **Los Lagos - Region X:** ***Chiloe Prov.:*** 28 km S of Castro, 42.67093°S 73.67644°W, 25 m, 01 Dec 1981, R.T. Schuh and N.I. Platnick, 3♂ (AMNH_ENT 00023946), 3♀ (AMNH_ENT 00023946), 15 nymphs (AMNH_ENT 00023946), 15♂ (AMNH_ENT 00021455–AMNH_ENT 00021469), 14♀ (AMNH_ENT 00021470–AMNH_ENT 00021483) (AMNH). 2♂ (AMNH_ENT00021451, AMNH_ENT 00021452) (EELM). 2♂ (AMNH_ENT 00023654, AMNH_ENT 00023655) (JTPC). 3♂ (AMNH_ENT 00021448–AMNH_ENT 00021450) (MNNC). 2♂ (AMNH_ENT 00021453, AMNH_ENT 00021454) (USNM). 5 km N of Quellon, 43.05°S 73.6°W, 110 m, 01 Dec 1981, R.T. Schuh and N.I. Platnick, 1♀ (AMNH_ENT 00023917), 8 nymphs (AMNH_ENT 00023917), 13♂ (AMNH_ENT 00021401–

AMNH_ENT 00021413), 9♀ (AMNH_ENT 00021392–AMNH_ENT 00021400) (AMNH). Chepu, 42.055°S 74.03161°W, 10 m, 28 Nov 1981–29 Nov 1981, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023928), 2♀ (AMNH_ENT 00023336, AMNH_ENT 00023928), 1 nymph (AMNH_ENT 000-23928), 6♂ (AMNH_ENT 00021108–AMNH_ENT 00021113), 6♀ (AMNH_ENT 00021102–AMNH_ENT 00021107) (AMNH). Chiloe I W Quemchi, 42.13944°S 73.48804°W, 34 m, 07 Apr 1968, L. E. Peña, 2♀ (AMNH_ENT 00023711, AMNH_ENT 00023712), 2♂ (AMNH_ENT 00021077, AMNH_ENT 000-21078), 2♀ (AMNH_ENT 00021079, AMNH_ENT 00021080) (JTPC). Chonchi, 42.61277°S 73.80916°W, 46 m, 02 Dec 1966, J. Moreau, 1♀ (AMNH_ENT 00023647) (MNNC). Dalcahue, Chiloe Island, 42.37814°S 73.65133°W, 4 m, 18 Jan 1962, R. Usinger, 1♀ (AMNH_ENT 00020667) (UCR); 01 Feb 1967, L. E. Peña, 5♂ (AMNH_ENT 00023680–AMNH_ENT 00023684), 1♀ (AMNH_ENT 00023685), 2♀ (AMNH_ENT 00021098, AMNH_ENT 000-21099) (JTPC). Isla Calbuco, 41.76666°S 73.13333°W, 07 Feb 1937, H. Schwabe, 1♀ (AMNH_ENT 00021100) (JTPC). Isla Chiloe, Lago Huillinco, 42.67473°S 73.90071°W, 25 m, 09 Feb 1981, T. Cekalovic, 1♂ (AMNH_ENT 00020967), 1♀ (AMNH_ENT 00020966) (AMNH). W of Quemchi, 42.125°S 73.5183°W, 07 Apr 1968, L. E. Peña, 6♂ (AMNH_ENT 00023691–AMNH_ENT 00023696) (JTPC). near Chepu at mouth of Rio Butalcura, 42.05°S 73.98°W, 4 m, 28 Nov 1981, R.T. Schuh and N.I. Platnick, 2♂ (AMNH_ENT 00023908), 2♀ (AMNH_ENT 00023908), 12 nymphs (AMNH_ENT 00023908), 6♂ (AMNH_ENT 00021006–AMNH_ENT 00021010, AMNH_ENT 00021134), 10♀ (AMNH_ENT 00020996–AMNH_ENT 00021005) (AMNH). ***Llanquihue Prov.:*** 2.5 km W of Saltos de Petrohue, margin of Rio Petrohue, 41.13333°S 72.4465°W, 190 m, 13 Dec 1981, R. T. Schuh and B. M. Massie, 8♂ (AMNH_ENT 00023324–AMNH_ENT 00023325, AMNH_ENT 00023932), 8♀ (AMNH_ENT 000-23326–AMNH_ENT 00023327, AMNH_ENT 00023932), 1 nymph (AMNH_ENT 00023932), 48♂ (AMNH_ENT 00020845–AMNH_ENT 00020846, AMNH_ENT 00020932–AMNH_ENT 00020942, AMNH_ENT 00021509–AMNH_ENT 00021543), 12♀ (AMNH_ENT 00020926–AMNH_ENT 00020931, AMNH_ENT 00021544–AMNH_ENT 00021549) (AMNH). 1♂ (AMNH_ENT 00023660) (JTPC). 26 km E Puerto Varas, 41.3162°S 72.6718°W, 100 m, 26 Nov 1981, R.T. Schuh and N.I. Platnick, 4♂ (AMNH_ENT 00023921), 3♀ (AMNH_ENT 000-23921), 14♂ (AMNH_ENT 00021242–AMNH_ENT 00021255), 17♀ (AMNH_ENT 00021225–AMNH_ENT 00021241) (AMNH). 3♂ (AMNH_ENT 00023661–AMNH_ENT 00023663), 2♀ (AMNH_ENT 00023674, AMNH_ENT 00023675) (JTPC). 28.1 km W of Ensenada, Rt 225, Lago llanquihue, 41.21666°S 72.65°W, 150 m, 12 Nov 1994, S. Oygur & E. Barrera, 2♂ (AMNH_ENT 00023602, AMNH_ENT 00023603), 1♀ (AMNH_ENT 00023604) (AMNH). 4 km SE Puerto Montt, 41.4871°S 72.9014°W, 30 m, 11 Dec 1981–12 Dec 1981, R. T. Schuh, 9♂ (AMNH_ENT 00023328, AMNH_ENT 000-23923, AMNH_ENT 00023952), 2♀ (AMNH_ENT 00023330, AMNH_ENT 00023952), 1 nymph (AMNH_ENT 00023923), 17♂ (AMNH_ENT 00021484–AMNH_ENT 000-21500), 8♀ (AMNH_ENT 00021501–AMNH_ENT 00021508) (AMNH). 6.2 km SE of Ensenada, 41.21666°S 72.65°W, 115 m, 12 Nov 1994, S. Oygur & E. Barrera, 5♂ (AMNH_ENT 00023611–AMNH_ENT 00023615), 1♀ (AMNH_ENT 00023616) (AMNH). ***Osorno Prov.:*** Lago Puyehue E of Entre Lagos, 40.68°S 72.37°W, 160 m, 24 Nov 1981, R.T. Schuh and N.I. Platnick, 12♂ (AMNH_ENT 00023338–AMNH_ENT 00023339, AMNH_ENT 00023915), 11♀ (AMNH_ENT 000-23340, AMNH_ENT 00023915), 10 nymphs (AMNH_ENT 00023915), 45♂ (AMNH_ENT 00021329–AMNH_ENT 00021357, AMNH_ENT 00021432–AMNH_ENT 000-21447), 27♀ (AMNH_ENT 00021362–AMNH_ENT 00021370, AMNH_ENT 00021414–AMNH_ENT 00021431) (AMNH). 2♀ (AMNH_ENT 00021360, AMNH_ENT 00021361) (EELM). 1♀ (AMNH_ENT 000-23672) (JTPC). 1♂ (AMNH_ENT 00021358), 1♀ (AMNH_ENT 00021359) (USNM). Puente El Avion, 16.5 km W of Puancho, 40.41666°S 73.35°W, 150 m, 11 Nov 1994, S. Oygur & E. Barrera, 6♂ (AMNH_ENT 00023595–AMNH_ENT 00023600), 1♀ (AMNH_ENT 00023601) (AMNH). vic. Termas de Puyehue, 40.66426°S 72.2854°W, 200 m, 24 Nov 1981, R.T. Schuh and N.I. Platnick, 4♂ (AMNH_ENT 00023333, AMNH_ENT 00023925, AMNH_ENT 00023931), 3♀ (AMNH_ENT 00023925, AMNH_ENT 00023931), 10 nymphs (AMNH_ENT 00023925, AMNH_ENT 00023931), 9♂ (AMNH_ENT 00020987–AMNH_ENT 00020995), 11♀ (AMNH_ENT 00020976–AMNH_ENT 00020986) (AMNH). ***Palena Prov.:*** 12 km W of jct of Futalefu and Palena roads, 43.47°S 72.12°W, 50 m, 16 Jan 1986, R.T. Schuh and N.I. Platnick, 5♂ (AMNH_ENT 00020835–AMNH_ENT 00020839) (AMNH). 20 km N of Chaiten, 42.74158°S 72.76319°W, 50 m, 17 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023916), 3♀ (AMNH_ENT 00023916), 2 nymphs (AMNH_ENT 00023916), 8♂ (AMNH_ENT 00020849–AMNH_ENT 00020856), 4♀ (AMNH_ENT 00020857–AMNH_ENT 00020860) (AMNH). 70 km S of Chaiten, 43.45386°S 72.40718°W, 500 m, 18 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023926), 3♀ (AMNH_ENT 00023926), 10 nymphs (AMNH_ENT 00023926), 17♂ (AMNH_ENT 00020796–AMNH_ENT 00020812), 5♀ (AMNH_ENT 00020813–AMNH_ENT 00020817) (AMNH). 90 km S of Chaiten on Rio Frio, S of Santa Lucia, 43.63°S 72.33°W, 80 m, 18 Jan 1986, R. T. Schuh, 2♂ (AMNH_ENT 00023912), 2♀ (AMNH_ENT 00023912), 5 nymphs (AMNH_ENT 00023912), 7♂ (AMNH_ENT 00020769–AMNH_ENT 00020775), 10♀ (AMNH_ENT 00020776–AMNH_ENT 00020785) (AMNH). Chaiten, 42.92144°S 72.71462°W, 17 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00020892) (AMNH). Chaiten, 42.92144°S 72.71462°W, 8 m, 06 Dec 1981, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023919), 1♀ (AMNH_ENT 00023919), 15 nymphs (AMNH_ENT 00023919), 35♂ (AMNH_ENT 00020971–AMNH_ENT 00020975, AMNH_ENT 00021175–AMNH_ENT 00021204), 22♀ (AMNH_ENT 00020968–AMNH_ENT 00020970, AMNH_ENT 00021206–AMNH_ENT 00021224) (AMNH). 1♂ (AMNH_ENT 00023659), 1♀ (AMNH_ENT 00023673) (JTPC). ***Valdivia Prov.:*** Lago Panguipulli, 37 km SE of Panguipulli, 39.75°S 72.33333°W, 300 m, 14 Nov 1994, S. Oygur & E. Barrera, 3♂ (AMNH_ENT 00023619–AMNH_ENT 00023621) (AMNH). Tres Esteros, Cord. San Jose, Stgo., 40.68333°S 72.88333°W, 105 m, 16 May 1947, L. E. Peña, 1♀ (AMNH_ENT00021174) (JTPC). **Magallanes y Antartica Chilena - Region XII:** ***Magallanes Prov.:*** 20 km S Punta Arenas, 53.3204°S 70.95856°W, 30 m, 17 Dec 1981, R. T. Schuh and B. M. Massie, 1♀ (AMNH_ENT 00023334), 8♂ (AMNH_ENT 00021035–AMNH_ENT 00021042), 4♀ (AMNH_ENT 00021043–AMNH_ENT 00021046) (AMNH). 2♀ (AMNH_ENT 00021047, AMNH_ENT 00021048) (MNNC). 61 km SE of Puerto Natales, 52.04°S 71.73°W, 100 m, 18 Dec 1981, R. T. Schuh and B. M. Massie, 11♂ (AMNH_ENT 00023331, AMNH_ENT 00023920), 6♀ (AMNH_ENT 00023332, AMNH_ENT 00023920), 26♂ (AMNH_ENT 00021120–AMNH_ENT 00021124, AMNH_ENT 00021292–AMNH_ENT 00021296, AMNH_ENT 00021304–AMNH_ENT 00021319), 16♀ (AMNH_ENT 00020847, AMNH_ENT 00021114–AMNH_ENT 00021119, AMNH_ENT 00021320–AMNH_ENT 00021328) (AMNH). 2♂ (AMNH_ENT 00021300, AMNH_ENT 00021301) (EELM). 3♂ (AMNH_ENT 00021297–AMNH_ENT 00021299) (MNNC). 2♂ (AMNH_ENT 00021302, AMNH_ENT 00021303) (USNM). Laguna Amarga, 50.98333°S 72.75°W, 130 m, 28 Feb 1969, L. E. Peña, 3♂ (AMNH_ENT 00021068–AMNH_ENT 00021070), 2♀ (AMNH_ENT 00021071, AMNH_ENT 00021072) (JTPC). Laguna Figueros (villa laguna), 28 Jan 1976, T. Cekalovic, 2♂ (AMNH_ENT 00021148, AMNH_ENT 00021149) (AMNH). N Mina Río, 16 Mar 1967, L. E. Peña, 2♀ (AMNH_ENT 00021158, AMNH_ENT 00021159) (JTPC). v. Punta Arenas, 53.15°S 70.91667°W, 30 m, 01 Dec 1962, P.J. Darlington, 1♀ (AMNH_ENT 00021169) (AMNH). ***Ultima Esperanza Prov.:*** 6 km SE Puerto Natales, 51.75871°S 72.4259°W, 90 m, 18 Dec 1981–20 Dec 1981, R. T. Schuh, B. M. Massie, 18♂ (AMNH_ENT 00021011–AMNH_ENT 00021028), 7♀ (AMNH_ENT 00021029–AMNH_ENT 00021034, AMNH_ENT 00021049) (AMNH). 3♂ (AMNH_ENT 00023666–AMNH_ENT 00023668), 2♀ (AMNH_ENT 00023670, AMNH_ENT 00023671) (JTPC). 7 km SE Puerto Natales, 51.78°S 72.44°W, 125 m, 20 Nov 1981, R.T.Schuh and B. Massie, 2♂ (AMNH_ENT 00023922), 19♂ (AMNH_ENT 00020901–

AMNH_ENT 00020919), 6♀ (AMNH_ENT 00020920–AMNH_ENT 00020925) (AMNH). **Maule - Region VII:** ***Curico Prov.:*** Vegas de Vagara, Rio Teno, 34.98333°S 71.38333°W, 2700 m, 20 Jan 1964, L. E. Peña, 4♀ (AMNH_ENT 00023713, AMNH_ENT 00023719–AMNH_ENT 00023721) (JTPC); 20 Jan 1964, L. E. Peña, 2♂ (AMNH_ENT 00023706, AMNH_ENT 00023707), 6♂ (AMNH_ENT 00021081–AMNH_ENT 00021084, AMNH_ENT 00021144–AMNH_ENT 00021145), 13♀ (AMNH_ENT 00021085–AMNH_ENT 00021088, AMNH_ENT 00021135–AMNH_ENT 00021143) (JTPC). ***Talca Prov.:*** 55.8 km E of San Clemente, Rio Maule, 35.76666°S 70.98333°W, 510 m, 06 Nov 1994, S. Oygur & E. Barrera, 7♂ (AMNH_ENT 00023531–AMNH_ENT 00023537), 7♀ (AMNH_ENT 00023538–AMNH_ENT 00023544) (AMNH). **Metropolitana De Santiago:** ***Cordillera Prov.:*** La Parva, 33.3°S 70.2667°W, 3700 m, 01 Dec 1983, G.A.S., 1♀ (AMNH_ENT 00023648) (MNNC). ***Santiago Prov.:*** Farellones, 33.3°S 70.25°W, 2700 m, 08 Sep 1962, L. E. Peña, 3♂ (AMNH_ENT 00021125–AMNH_ENT 00021127), 1♀ (AMNH_ENT 00021128) (AMNH). 5♀ (AMNH_ENT 00023714–AMNH_ENT 00023718), 6♂ (AMNH_ENT 00021089–AMNH_ENT 00021094), 3♀ (AMNH_ENT 00021095–AMNH_ENT 00021097) (JTPC). Farellones, 33.3°S 70.25°W, 2700 m, 08 Apr 1962, L. E. Peña, 4♂ (AMNH_ENT 00023702–AMNH_ENT 00023705) (JTPC). Laguna de Aculeo, 33.856°S 70.926°W, 375 m, 12 Nov 1981, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023342), 1♀ (AMNH_ENT 00023341) (AMNH). **Valparaiso - Region V:** ***Los Andes Prov.:*** 40 km E of Los Andes, 32.90388°S 70.25°W, 1500 m, S. Oygur & E. Barrera, 12♂ (AMNH_ENT 00023564–AMNH_ENT 00023575), 14♀ (AMNH_ENT 00023576–AMNH_ENT 00023589) (AMNH). ***Quillota Prov.:*** 9 km W jct Rts 60 & 5, Rio Aconcagua, 32.66972°S 71.2°W, 240 m, 01 Nov 1994, S. Oygur & E. Barrera, 1♂ (AMNH_ENT 00023555) (AMNH).

Pseudosaldula huamachuco, new species
Plate 3; figures 1, 12; map 7

DIAGNOSIS: Known only from brachypterous specimens; recognized by the small size, the highly polished anterior two-thirds of the exocorium and extensively polished claval commissure contrasting with otherwise dull hemelytra, the extensive pruinose areas on the clavus and corium, and the dense dorsal vestiture composed of recumbent, golden, shining and suberect, dull-black, simple setae of moderate length, both types also occurring on the forewing membrane. Similar to *P. andensis*, *P. bruesi*, and *P. vulgaris* in its possession of numerous setae on the membrane, at least on the veins, but those species with only a single setal type on the membrane, the setae being shorter in *P. vulgaris* than in the other three species. Easily distinguished from small specimens of *P. vulgaris* by the entirely dull exocorium in that species and from *P. andensis* and *P. bruesi* by the polished areas on the corium in those species.

DESCRIPTION: *Male*: Total length 2.71, width pronotum 0.99. COLORATION (pl. 3): Hemelytron ranging from almost entirely dark with cells of membrane at least partially pale, to totally pale; corium and clavus with extensive pruinose areas, these appearing off-white in pale specimens; antennal segments 1 and 2 pale to moderately darkened, segments 3 and 4 more strongly darkened; legs, including at least apical portion of coxae, largely pale with some darkened areas. SURFACE AND VESTITURE (pl. 3): Corium and membrane dull except for highly polished anterior two-thirds of exocorium and very broadly polished claval commissure. Vestiture of the dorsum consisting of medium length suberect black setae intermixed with golden, shining setae, both setal types also occurring on veins of membrane. STRUCTURE (pl. 3): Known from brachypterous forms only, body ranging from ovoid to teardrop shaped. **Thorax**: Pronotum with lateral margins straight to weakly convex, distinctly narrowing anteriorly. *Hemelytra*: Membrane of forewing with four distinct cells. GENITALIA (figs. 1, 12A–C): **Parandria**: Inner sclerotized margin convexly rounded; posterior margin weakly curving to nearly straight. **Parameres**: Processus sensualis with 10–15 setae on the sensory lobe with another group of setae on the anterior face and distad to the processus sensualis itself.

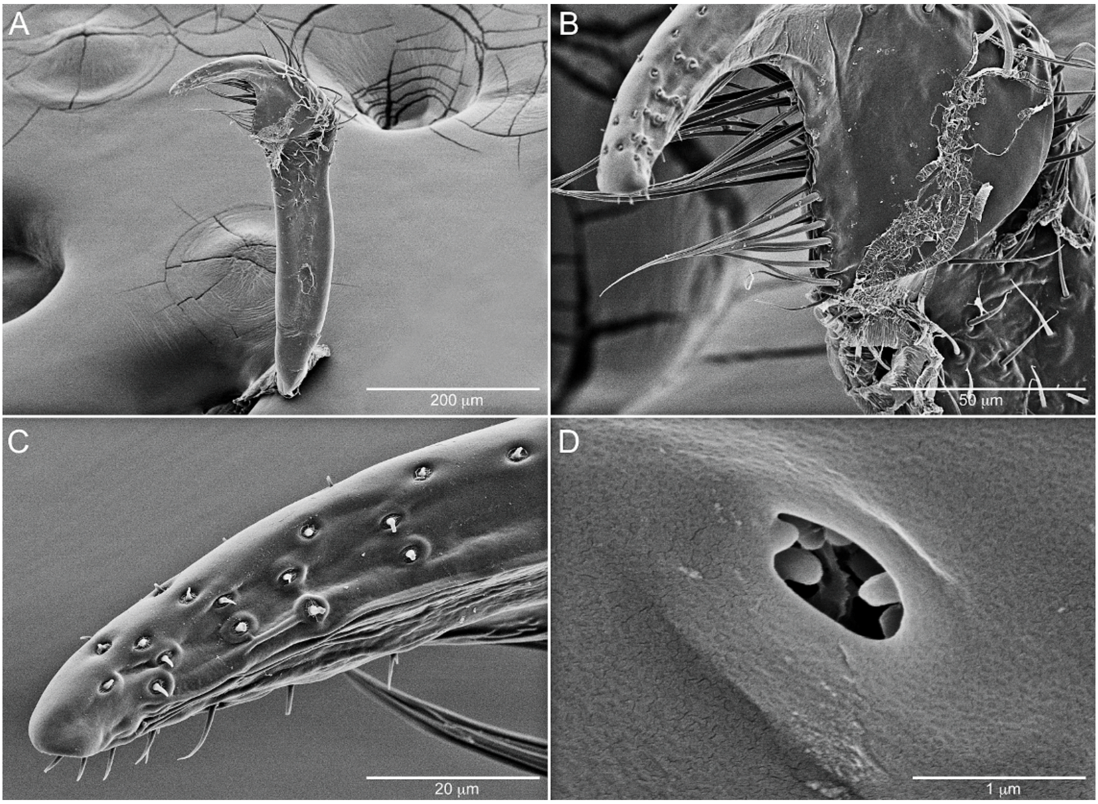


Fig. 12. *Pseudosaldula huamachuco* (scanning electron micrographs). **A.** General view of ventral face of right paramere. **B.** Detail of setae on processus sensualis as viewed from ventral face of paramere. **C.** Apex of left paramere showing short setiform sensors. **D.** Detail of gland pore on paramere.

Female (pl. 3): Total length 2.82, width pronotum 1.07. COLORATION (pl. 3): As in male. SURFACE AND VESTITURE (pl. 3): As in male. STRUCTURE: Known from brachypterous forms only. **Abdomen**: See generic description. GENITALIA: See generic description.

ETYMOLOGY: Named for its occurrence near the Peruvian town of Huamachuco, La Libertad Department; a noun in apposition.

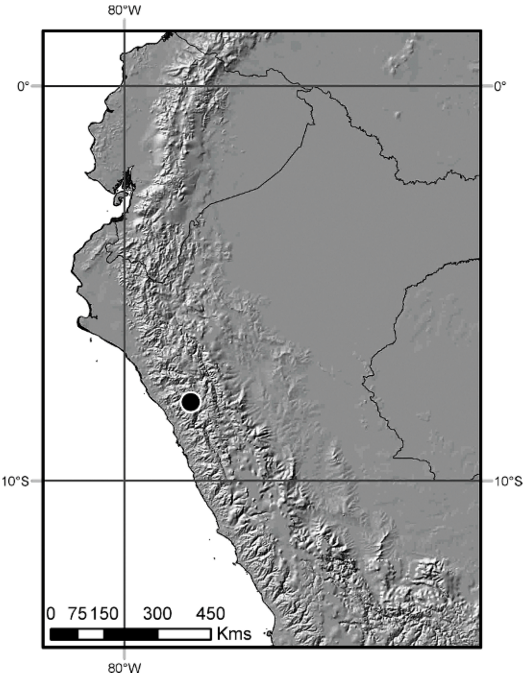
HABITAT DATA AND ALTITUDINAL RANGE: Known from a single locality at 3930 meters. Available specimens were collected on the margin of a small pond, with 70%–100% vegetative cover.

DISTRIBUTION: La Libertad Department, northern Peru.

DISCUSSION: The appearance of *P. huamachuco* is very similar to that of small specimens of *P. vulgaris*, including the form of the vestiture, the strong brachyptery, and the dark and pale pigmentation of the hemelytra. The two species also occur in similar habitats and are sympatric with one another. Nonetheless, the distinctive attributes of *P. huamachuco* are consistent and readily observed, as are those of the much more common and widespread *P. vulgaris*.

HOLOTYPE: **PERU: La Libertad:** 38 km SW of Huamachuco, 8.0109°S 78.31887°W, 3930 m, 21 Jan 1976, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00023365) (AMNH).

PARATYPES: **PERU: La Libertad:** 38 km SW of Huamachuco, 8.0109°S 78.31887°W, 3930 m, 21 Jan 1976, R.T. and J.C. Schuh, 6♂ (AMNH_ENT 00020093, AMNH_ENT 00023360–AMNH_ENT 00023364), 6♀ (AMNH_ENT 00023366–AMNH_ENT 00023371), 8♂ (AMNH_ENT 00022935–AMNH_ENT 00022-942), 6♀ (AMNH_ENT 00022945–AMNH_ENT 00022950) (AMNH). 1♂ (AMNH_ENT 00022943), 1♀ (AMNH_ENT 000-

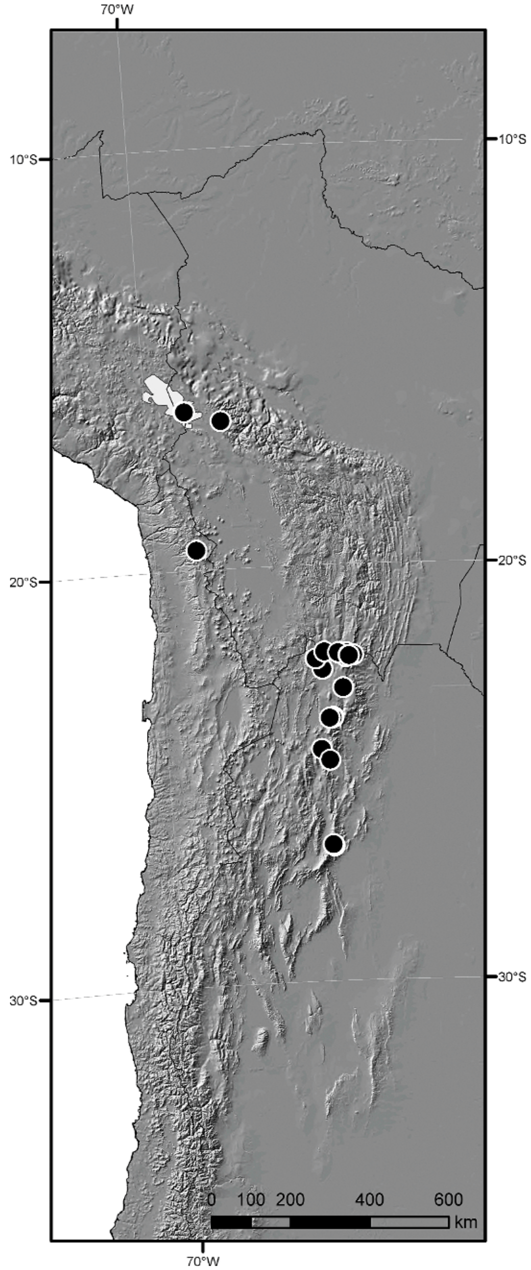


Map 7. Distribution of *Pseudosaldula huamachuco*.

22951) (EELM). 2♂ (AMNH_ENT 00023838, AMNH_ENT 00023839), 2♀ (AMNH_ENT 00023840, AMNH_ENT 00023841) (JTPC). 1♂ (AMNH_ENT 00022944), 1♀ (AMNH_ENT 00022952) (USNM).

Pseudosaldula penai, new species
Plate 3; figures 1, 2; map 8

DIAGNOSIS: Macropterous or brachypterous; recognized by antennal segment 1 with a black stripe lateroventrally, foretibia unicolorous pale, and dorsum uniformly and densely clothed with reclining, shining, golden setae intermixed with reclining black setae of moderate length, the latter readily visible on the lateral margin of the pronotum and in specimens with pale hemelytra; also, veins of membrane in forewing with a few setae as on corium and hemelytra dull, except for partially polished area along claval commissure, with scattered areas of weak pruinosity. Entirely dull hemelytra with reclining golden and black setae similar to condition found in *P. chilensis* and *P. vulgaris*; hemelytra also entirely dull in *P. pilosa*, but that species with long, erect, black, shaggy setae on dorsum; black stripe lateroventrally on antennal segment 1 also seen in *P. chilensis* and *P. salina*, but the former species with a black stripe also dorsomedially on antennal segment 1 and the latter species with only reclining black setae on the dorsum. Also,



Map 8. Distribution of *Pseudosaldula penai*.

potentially confused with *P. bergi*, but that species with a unicolorous pale antennal segment 1 and with only a very few golden, shining setae on the dorsum.

DESCRIPTION: *Male*: Total length 3.29, width pronotum 1.30. COLORATION (pl. 3): Hemelytron ranging from almost entirely dark with cells of membrane at least partially pale and corium and clavus with scattered weakly pruinose areas, to largely pale with only anterior two-thirds of clavus and base of corium dark and with pruinose areas appearing almost white; antennal segment 1 mostly pale with a black ventrolateral stripe on basal two-thirds, segment 2 pale to weakly darkened, and segments 3 and 4 more strongly darkened; legs, including at least apical portion of coxae, largely pale with some brown spots on femora. SURFACE AND VESTITURE (pl. 3): Hemelytron dull except half of claval commissure polished at area of overlap. Vestiture of dorsum consisting of medium length reclining black setae intermixed with golden shining setae; veins of membrane with a few setae. STRUCTURE: Known from macropterous and brachypterous forms, body ranging from ovoid in the former to teardrop shaped in the latter. **Thorax**: Pronotum with lateral margins straight to weakly convex, distinctly narrowing anteriorly. *Hemelytra*: Membrane of forewing with five distinct cells, even in brachypterous forms. GENITALIA (figs. 1, 2): **Parandria**: Inner sclerotized margin straight, angled posterolaterally; posterior margin weakly concave. **Parameres**: Processus sensualis with 10–15 setae.

Female (pl. 3): Total length 3.27, width pronotum 1.30. COLORATION (pl. 3): As in male; subgenital plate broadly pale apically. SURFACE AND VESTITURE (pl. 3): As in male; macropterous and brachypterous forms with a few setae on veins of membrane. STRUCTURE: Known from macropterous and brachypterous forms. **Abdomen**: See generic description. GENITALIA: See generic description.

ETYMOLOGY: Named for the late Luis Peña, who collected a significant amount of material used in this project and who has contributed greatly to our understanding of the insect fauna of Chile.

HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between 2900 and 4500 meters, with many of the specimens coming from altitudes in excess of 4000 meters. Available habitat data indicate that *P. penai* is almost always encountered on seep areas with extensive vegetative cover.

DISTRIBUTION: Bolivia, extreme northern Chile, and northwestern Argentina.

DISCUSSION: This species was collected at the highest altitude for any known *Pseudosaldula* species, 4500 meters east of La Quiaca, Jujuy Province, Argentina. Known habitats are similar to those in which *P. vulgaris* has been commonly collected. Nonetheless, the two species are allopatric.

HOLOTYPE: **ARGENTINA: Salta:** just NW of Santa Rosa de Tastil on Rt 51, 24.4415°S 65.96683°W, 3215 m, 18 Feb 1993, R. T. Schuh and J. T. Polhemus, 1♂ (AMNH_ENT 00023372) (AMNH).

PARATYPES: **ARGENTINA: Jujuy:** 15 km NW of Abra Pampa, 22.51666°S 65.86666°W, 3920 m, 14 Feb 1993, R. T. Schuh, J. T. Polhemus, 3♂ (AMNH_ENT 00023130–AMNH_ENT 00023132), 3♀ (AMNH_ENT 00023125–AMNH_ENT 00023127) (AMNH). 20 km S of Yoscaba, stream flowing into Lago Pozuelos, 22.26666°S 66.03333°W, 3710 m, 14 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♀ (AMNH_ENT 00020875), 1♂ (AMNH_ENT 00023065), 1♀ (AMNH_ENT 00023064) (AMNH). 22 km E of Yavi, 22.14°S 65.23°W, 4040 m, 12 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 2♂ (AMNH_ENT 00023063, AMNH_ENT 00023095) (AMNH). 45 km E of La Quiaca, 22.21666°S 65.26666°W, 4100 m, 12 Feb 1993, R. T. Schuh and J. T. Polhemus, 6♂ (AMNH_ENT 00023374, AMNH_ENT 00023478–AMNH_ENT 00023482), 10♀ (AMNH_ENT 00023375–AMNH_ENT 00023376, AMNH_ENT 00023483–AMNH_ENT 00023490) (AMNH). 49 km E of LaQuica, 22.23333°S 65.25°W, 4300 m, 12 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 14♂ (AMNH_ENT 00023062, AMNH_ENT 00023103–AMNH_ENT 00023112, AMNH_ENT 00023114–AMNH_ENT 00023116), 6♀ (AMNH_ENT 00023118–AMNH_ENT 00023123) (AMNH). 1♂ (AMNH_ENT 00023113), 1♀ (AMNH_

ENT 00023124) (JTPC). 7 km E of Cienaguillas, betw LaQuica/Cienaguillas, 22.1°S 65.8°W, 3750 m, 14 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♂ (AMNH_ENT 00023378), 5♂ (AMNH_ENT 00023082–AMNH_ENT 00023086), 2♀ (AMNH_ENT 00023128, AMNH_ENT 00023129) (AMNH). 9 km E of Iturbe, 22.21666°S 65.16666°W, 3460 m, 15 Feb 1993, R. T. Schuh, J. T. Polhemus, 7♂ (AMNH_ENT 00023323, AMNH_ENT 00023379, AMNH_ENT 00023473–AMNH_ENT 00023477), 1♂ (AMNH_ENT 00023059) (AMNH). 1♀ (AMNH_ENT 00020877) (IMLA). Cuesta de Lipan, 28 km W of Parmamarca on Rt 52, 23.6815°S 65.62666°W, 3825 m, 16 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♀ (AMNH_ENT 00023381), 3♂ (AMNH_ENT 00023133–AMNH_ENT 00023135) (AMNH). 1♂ (AMNH_ENT 00023143) (MACN). 1♂ (AMNH_ENT 00023144) (IMLA). Cueva Iturbe, 22.98°S 65.35°W, 3700 m, 10 Nov 1899, Weiser, 2♂ (AMNH_ENT 00023868, AMNH_ENT 00023874) (MACN). El Quemado, blw summit Abra Potrerillo on Rt 52, 23.69383°S 65.64933°W, 4170 m, 16 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 4♂ (AMNH_ENT 00023136–AMNH_ENT 00023139), 8♀ (AMNH_ENT 00023146–AMNH_ENT 00023153) (AMNH). 1♂ (AMNH_ENT 00023140), 1♀ (AMNH_ENT 00023154) (JTPC). 1♀ (AMNH_ENT 00023158) (MACN). 1♂ (AMNH_ENT 00023142), 1♀ (AMNH_ENT 00023157) (MNNC). 1♂ (AMNH_ENT 00023145), 2♀ (AMNH_ENT 00023159, AMNH_ENT 00023160) (IMLA). 1♂ (AMNH_ENT 00023141), 2♀ (AMNH_ENT 00023155, AMNH_ENT 00023156) (USNM). Ronqui Angosto, 12 km E of Rt 40 on Rt 52, 23.69666°S 65.72666°W, 3735 m, 16 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♂ (AMNH_ENT 00023377), 3♂ (AMNH_ENT 00023087–AMNH_ENT 00023089), 1♀ (AMNH_ENT 00023090) (AMNH). along river just N of Yavi, 22.13333°S 65.45°W, 3500 m, 13 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♂ (AMNH_ENT 00023640), 1♂ (AMNH_ENT 00023061), 1♀ (AMNH_ENT 00023060) (AMNH). **Salta:** 17 km W of Santa Victoria, 22.2°S 65.06°W, 3488 m, 13 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♀ (AMNH_ENT 00023056) (AMNH). Abra Lizoite, 1–2 km blw summit on Prov Rt 7 btw La Quica/Santa Victoria, 22.21°S 65.18°W, 4500 m, 12 Feb 1993, R. T. Schuh, J. T. Polhemus, 2♀ (AMNH_ENT 00023091, AMNH_ENT 00023117) (AMNH). Rt 7, km 17, 57 km W of Santa Victoria, 22.21666°S 65.16666°W, 4500 m, 12 Feb 1993, R. T. Schuh, J. T. Polhemus, 1♀ (AMNH_ENT 00023380), 11♂ (AMNH_ENT 00023036–AMNH_ENT 00023046), 9♀ (AMNH_ENT 00023047–AMNH_ENT 00023055) (AMNH). just NW of Santa Rosa de Tastil on Rt 51, 24.4415°S 65.96683°W, 3215 m, 18 Feb 1993, R. T. Schuh and J. T. Polhemus, 6♀ (AMNH_ENT 00023373, AMNH_ENT 00023964–AMNH_ENT 00023965), 36♂ (AMNH_ENT 00023008, AMNH_ENT 00023010–AMNH_ENT 00023017, AMNH_ENT 00023019–AMNH_ENT 00023021, AMNH_ENT 00023028–AMNH_ENT 00023035, AMNH_ENT 00023066–AMNH_ENT 00023081), 26♀ (AMNH_ENT 000f22972–AMNH_ENT 00022997) (AMNH). 1♂ (AMNH_ENT 00023026), 1♀ (AMNH_ENT 00023004) (EELM). 2♂ (AMNH_ENT 00023009, AMNH_ENT 00023022), 3♀ (AMNH_ENT 00022998–AMNH_ENT 00023000) (JTPC). 1♂ (AMNH_ENT 00023027), 1♀ (AMNH_ENT 00023007) (MACN). 1♂ (AMNH_ENT 00023024), 1♀ (AMNH_ENT 00023003) (MNNC). 1♂ (AMNH_ENT 00023025), 2♀ (AMNH_ENT 00023005, AMNH_ENT 00023006) (IMLA). 1♂ (AMNH_ENT 00023023), 2♀ (AMNH_ENT 00023001, AMNH_ENT 00023002) (USNM). km 59.5 on Rt 51, 24.71°S 65.76°W, 2555 m, 18 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♂ (AMNH_ENT 00023950), 1♀ (AMNH_ENT 00023950) (AMNH). **Tucuman:** 16 km W of Tafi del Valle on Rt 307, 26.7685°S 65.73083°W, 2900 m, 21 Feb 1993, R. T. Schuh and J. T. Polhemus, 1♂ (AMNH_ENT 00023058) (AMNH). [Paso] Infernillo on Rt 307, 31 km E of Amaicha del Valle, 26.74°S 65.76°W, 3030 m, 21 Feb 1983, R. T. Schuh, J. T. Polhemus, 1♂ (AMNH_ENT 00023057) (AMNH). **BOLIVIA: La Paz:** 10 km SE of Copacabana (Omasuyos Province), 16.1924°S 69.04693°W, 4115 m, 03 Sep 1989, D. A. and J. T. Polhemus, 1♂ (AMNH_ENT 00023743), 1♀ (AMNH_ENT 00023753), 3♂ (AMNH_ENT 00023096,

AMNH_ENT 00023100–AMNH_ENT 00023101), 2♀ (AMNH_ENT 00023097, AMNH_ENT 00023098) (JTPC). 20 km S Copacabana, 16.20468°S 69.01663°W, 3944 m, 03 Sep 1989, D. A. and J. T. Polhemus, 1♀ (AMNH_ENT 00023099) (JTPC). Alto Rio Kaluyo, 16.467°S 68.133°W, 4100 m, 17 Aug 1980, W.H., 1♂ (AMNH_ENT 00023745), 2♀ (AMNH_ENT 00023754, AMNH_ENT 00023755) (JTPC). **CHILE: Tarapaca - Region I: *Iquique Prov..:*** 30 km E Alto Chiapa, 19.53°S 68.93°W, 4100 m, 25 Apr 1969, L. E. Peña, 1♂ (AMNH_ENT 00023102) (AMNH).

OTHER SPECIMENS EXAMINED: **ARGENTINA: Salta:** just NW of Santa Rosa de Tastil on Rt 51, 24.4415°S 65.96683°W, 3215 m, 18 Feb 1993, R. T. Schuh and J. T. Polhemus, 6♂ (AMNH_ENT 00023964, AMNH_ENT 00023965), 19 nymphs (AMNH_ENT 00023963–AMNH_ENT 00023965) (AMNH). km 59.5 on Rt 51, 24.71°S 65.76°W, 2555 m, 18 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 10 nymphs (AMNH_ENT 00023950) (AMNH).

Pseudosaldula perula (Drake)
Plate 4; figures 1, 3, 13; map 9

Pentacora perula Drake, 1955: 156 (n. sp.).
Oreokora perula: Drake, 1962: 122 (n. comb.).
Pseudosaldula perula: Schuh et al., 1987: 316 (n. comb., cat.).

DIAGNOSIS: Recognized by the vestiture of the dorsum consisting of medium length reclining black setae intermixed with golden, shining setae, and extensive pruinose areas on clavus and corium, with only the embolar area narrowly polished. Similar to *P. aurea* in type of vestiture, but setae on dorsum long and shaggy and radial vein polished over entire length in that species. Distribution of *P. perula* ranging from northern Peru to northern Argentina, whereas *P. aurea* known only from northern Argentina.

REDESCRIPTION: *Male*: Total length 2.90, width pronotum 1.10. COLORATION (pl. 4): Hemelytron almost entirely dark with cells of membrane at least partially pale and corium and clavus with extensive pruinose areas; antennal segments 1 and 2 pale to moderately darkened, segments 3 and 4 more strongly darkened; legs, including at least apical portion of coxae, largely pale with some areas of infuscation; apex of foretibia with a narrow, contrasting brown band. SURFACE AND VESTITURE (pl. 4): Hemelytron, including membrane, dull except anterior half of radial vein and embolar area of exocorium variably polished. Vestiture of the dorsum consisting of medium length, reclining, black setae intermixed with golden shining setae, these also occurring on veins of membrane in brachypterous forms. STRUCTURE (pl. 4): Known only from teardrop shaped brachypterous forms. **Thorax**: Pronotum with lateral margins nearly straight, distinctly narrowing anteriorly. *Hemelytra*: Membrane of forewing always with five distinct cells. GENITALIA (figs. 1, 3, 13A, B): **Parandria**: Inner sclerotized margin nearly straight; posterior margin emarginated medially. **Parameres**: Processus sensualis with ~20 setae.

Female (pl. 4): Total length 3.64, width pronotum 1.40. COLORATION (pl. 4): Coloration of hemelytron ranging from almost entirely dark to largely pale with a contrasting dark area in exocorium and with pruinose areas appearing almost white. SURFACE AND VESTITURE (pl. 4): As in male, except veins of membrane virtually devoid of setae in macropterous forms. STRUCTURE (pl. 4): Known from macropterous and brachypterous forms; cell 1 in membrane broad in macropterous forms, narrow in brachypterous forms. **Abdomen**: See generic description. GENITALIA: See generic description.

HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between 2300–2800 meters. Available habitat data indicate specimens were collected on muddy or sandy heavily vegetated seeps or river margins, some of which appeared to be alkaline in character.

DISTRIBUTION: Known from Amazonas Department in northern Peru south to Salta Province, northern Argentina.

DISCUSSION: The holotype of *perula* is somewhat teneral and slightly shriveled. Drake also designated a female allotype, which is in somewhat better condition and is brachypterous, as opposed to the male, which has developed, although somewhat shortened fore- and hind wings. None of the specimens available for comparison match up with the holotype or allotype exactly, because

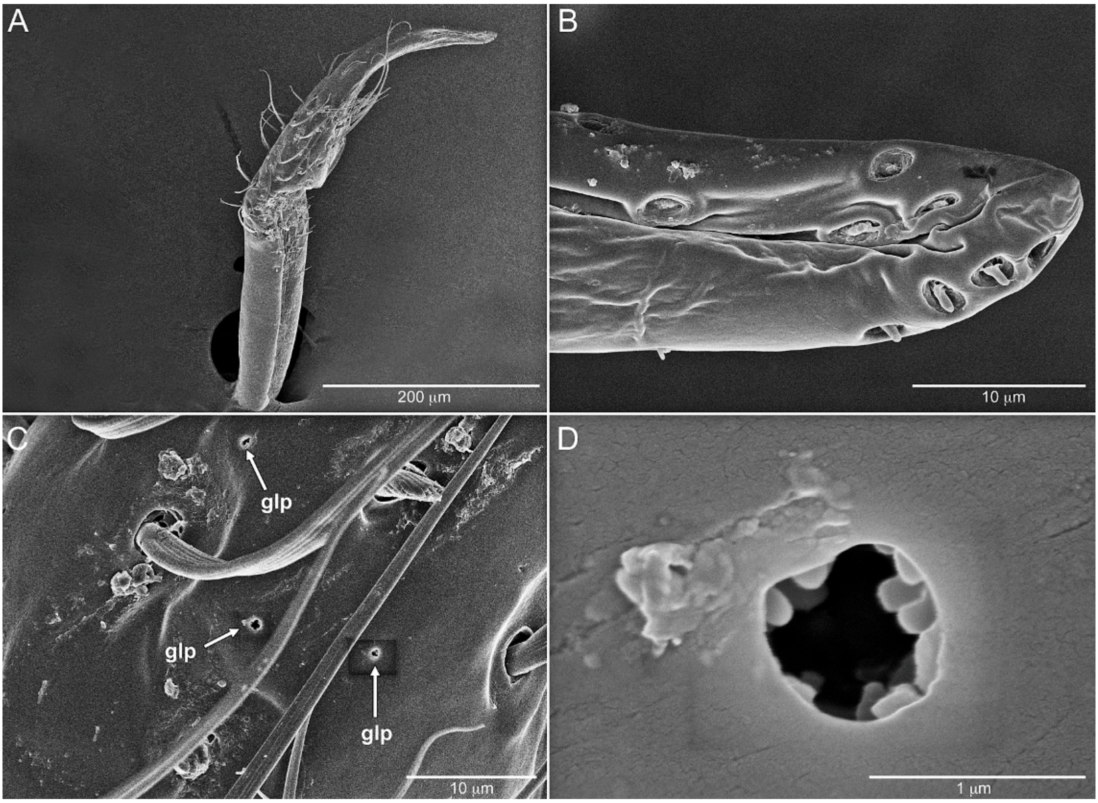
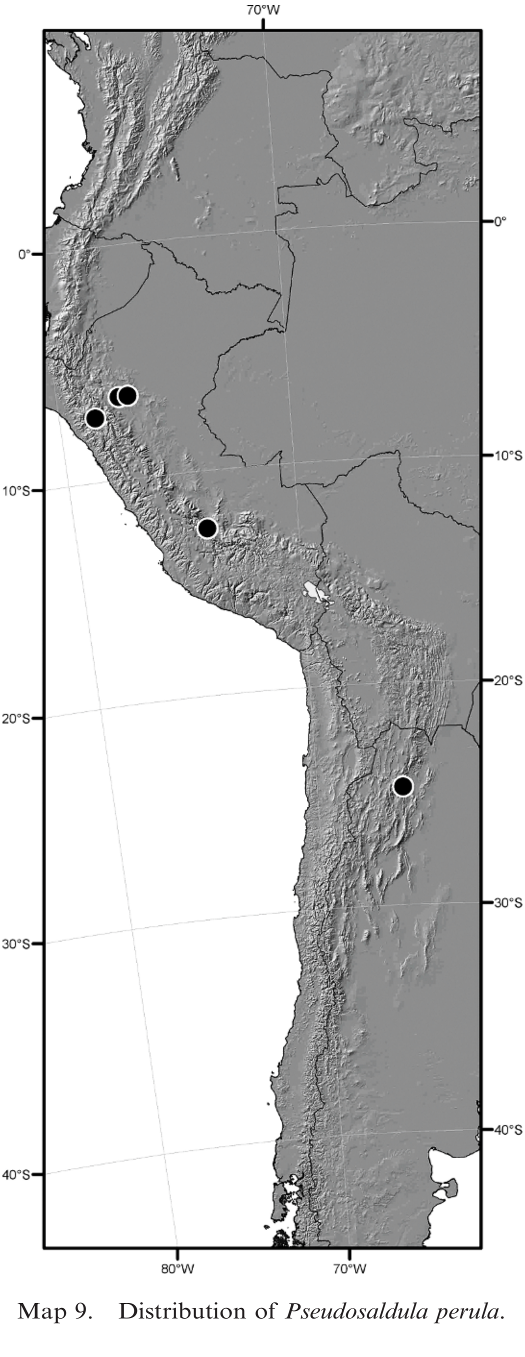


Fig. 13. *Pseudosaldula perula* (scanning electron micrographs). **A.** Lateroventral view of left paramere. **B.** Apex of left paramere showing short setiform sensors. **C.** Detail of ventral face at level of processus sensualis showing perspective view of the gland pores. **D.** Detail of gland pore on paramere. **glp,** gland pore.

all of the males are brachypterous, whereas the only macropterous or submacropterous specimens available to us are females.

HOLOTYPE: Submacropterous male, "PERU, S. A., March 20, 1941, F. Woytkowski, No. 423; Dept. Ayacucho, Prov. Huanta, Andes 2800 m a.s.l., Ponds; Type *Pentacora perula* Drake." Deposited in KU.

SPECIMENS EXAMINED: **ARGENTINA: Salta:** km 59.5 on Rt 51, 24.71°S 65.76°W, 2555 m, 18 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 3♂ (AMNH_ENT 00023630–AMNH_ENT 00023632) (AMNH). 1♂ (AMNH_ENT 00023633), 1♀ (AMNH_ENT 00023639) (IMLA). **PERU: Amazonas:** Chachapoyas, 6.41667°S 77.33333°W, 2300 m, 12 Jul 1972, R.T. and J.C. Schuh, 2♀ (AMNH_ENT 00023386, AMNH_ENT 00023387), 11 nymphs (AMNH_ENT 00023993, AMNH_ENT 00023994), 2♀ (AMNH_ENT 00022742, AMNH_ENT 000-22743) (AMNH). 1♂ (AMNH_ENT 00023825) (JTPC). Molinopampa, 43 km E Chachapoyas, 6.41652°S 76.94229°W, 2300 m, 11 Jul 1972, R.T. and J.C. Schuh, 5♂ (AMNH_ENT 00020089, AMNH_ENT 00023163, AMNH_ENT 00023382–AMNH_ENT 00023384), 7♀ (AMNH_ENT 00022721–AMNH_ENT 00022-726, AMNH_ENT 00023385), 9♂ (AMNH_ENT 00022730–AMNH_ENT 00022737, AMNH_ENT 00022741) (AMNH). 1♀ (AMNH_ENT 00022727), 1♂ (AMNH_ENT 00022738) (EELM). 2♂ (AMNH_ENT 00023826, AMNH_ENT 00023827), 4♀ (AMNH_ENT 00023828–AMNH_ENT 00023831) (JTPC). 1♀ (AMNH_ENT 00022729), 1♂ (AMNH_ENT 00022740) (IMLA). 1♀ (AMNH_ENT 00022728), 1♂ (AMNH_ENT 00022739) (USNM). **Ayacucho:** Huanta Province, Andes, 12.56°S 74.09°W, 2800 m, 08 Mar 1941–14 Mar 1941, F.



Map 9. Distribution of *Pseudosaldula perula*.

Woytkowski, Paratype, 1♂ (AMNH_ENT 00023864) (USNM). **Cajamarca:** 2 km W of Llacanora, nr Cajamarca, 7.20943°S 78.44278°W, 2530 m, 19 Jan 1976, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00022744) (AMNH).

Pseudosaldula pilosa, new species
Plates 4, 7G, H, 8C–E; figures 1, 3, 14; map 10

DIAGNOSIS: Most known specimens brachypterous, some apparently submacropterous; relatively large, females heavy bodied; hemelytra uniformly dull except for polished claval commissure; vestiture of dorsum composed of long, erect, dull simple setae, length approximately 2 times hind tibial diameter. Dull hemelytra lacking pruinosity similar in appearance to *P. bergi*, but the two species easily distinguished by the long, erect, dull setae found in *P. pilosa* as compared to the short recumbent vestiture in *P. bergi*. Distribution of *P. pilosa* and *P. bergi* overlapping in southern portion of range of *P. pilosa*.

DESCRIPTION: *Male*: Total length 3.23, width pronotum 1.19. COLORATION (pl. 4): Hemelytron lacking pruinose areas, ranging from almost entirely dark with cells of membrane, some areas of adjacent corium, and usual spot near apex of clavus weakly pale, to mostly pale with basal two-thirds of clavus dark with a few areas of infuscation and with some weakly contrasting ovoid paler areas on corium; antennal segments 1 and 2 pale to weakly darkened, segments 3 and 4 more strongly darkened; legs, including at least apical portion of coxae, largely pale, apex of foretibia with a narrow, brown band. SURFACE AND VESTITURE (pl. 4): Corium, clavus, and membrane dull except along claval commissure. Vestiture of dorsum, including veins of membrane, composed of mostly dull, nearly erect, dark, long, simple setae. STRUCTURE (pl. 4): Known from brachypterous and possibly submacropterous forms, body in most specimens teardrop shaped, broadest just posterior to midpoint of claval commissure. **Thorax**: Pronotum with lateral margins weakly convex. *Hemelytra*: Membrane of forewing with five distinct cells, cells 1 and 5 always shorter than the other three in brachypterous forms. GENITALIA (figs. 1, 3, 14A–C): **Parandria**: Inner sclerotized margin smoothly rounded; posterior margin weakly curving with a medial prominence. **Parameres**: Processus sensualis with 10–15 setae.

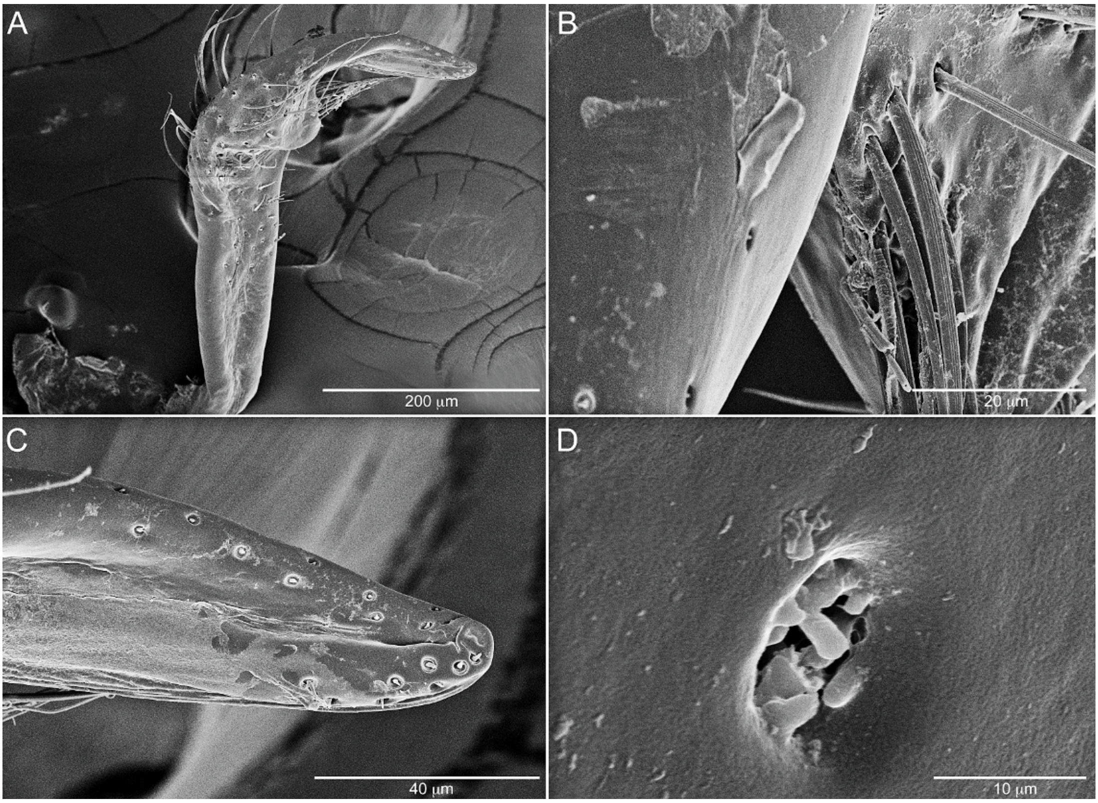


Fig. 14. *Pseudosaldula pilosa* (scanning electron micrographs). Left paramere. **A.** General view of ventral face. **B.** Detail of setae on processus sensualis. **C.** Apex of paramere showing short setiform sensors. **D.** Detail of gland pore on paramere.

Female (pl. 4): Total length 3.53, width pronotum 1.34. COLORATION (pl. 4): As in male. SURFACE AND VESTITURE (pl. 4): As in male. STRUCTURE: Known from macropterous and brachypterous forms. **Abdomen**: See generic description. GENITALIA: See generic description.

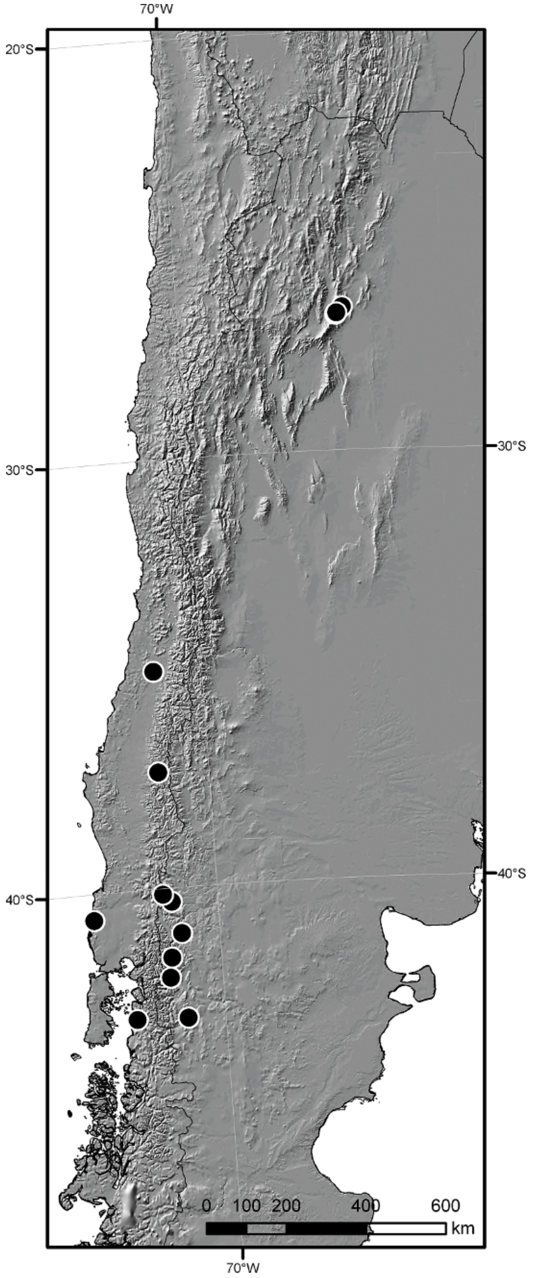
ETYMOLOGY: Named for long erect vestiture on the dorsum, from the Latin *pilosus*, "hairy".

HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between sea level and 3030 meters. Available habitat data indicate that specimens from the two sea-level localities were taken in grassy areas at the high tide mark. Approximately 65% of the eight remaining localities with habitat data are the shores of ponds or streams with the other 35% being seeps; in all cases the substrate had significant vegetative cover.

DISTRIBUTION: Known from moderately high altitudes in Tucuman Province, northwestern Argentina to sea level in the Araucania and Los Lagos provinces of south-central Chile.

DISCUSSION: Even though the limited numbers of specimens taken from sea-level localities certainly conform to our overall concept of *P. pilosa*, most known specimens from the southern part of the range are from high altitudes along both the eastern and western slopes of the Andean spine. As such, the distribution of *P. pilosa* is largely allopatric with that of *P. bergi*, with which it shares many morphological similarities.

HOLOTYPE: **ARGENTINA: Tucuman:** El Infiernillo (31 km E of Amaicha del Valle on Rt 307), 26.5997°S 65.6039°W, 3030 m, 21 Feb 1993, R. T. Schuh and J. T. Polhemus, 1♂ (AMNH_ENT 00023408) (AMNH).



Map 10. Distribution of *Pseudosaldula pilosa*.

PARATYPES: **ARGENTINA: Chubut:** 17 km E of Esquel on Rt 40, 42.97°S 71.15°W, 800 m, 22 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00022922), 3♀ (AMNH_ENT 00022927–AMNH_ENT 00022929) (AMNH). N shore of Lago Puela, 42.04°S 71.59°W, 160 m, 15 Jan 1986, R.T. Schuh and N.I. Platnick, 4♂ (AMNH_ENT 00022923–AMNH_ENT 00022926) (AMNH). **Neuquen:** 53 km S of San Martin de los Andes, Rio Pichi Traful, 40.32°S 71.38°W, 790 m, 12 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023980), 1♀ (AMNH_ENT 00023980), 2♂ (AMNH_ENT 00022898, AMNH_ENT 00022899) (AMNH). Lago Lacar, Hua Hum, 40.14445°S 71.62194°W, 650 m, 13 Jan 1986, R.T. Schuh and N.I. Platnick, 1♀ (AMNH_ENT 00023966) (AMNH). Nahuel Huapi, 41.05°S 71.15°W, 880 m, 11 Jan 1986, R.T. Schuh and N.I. Platnick, 2♂ (AMNH_ENT 00022888, AMNH_ENT 00022889) (AMNH). **Rio Negro:** 47 km N of El Bolson, Rio Villegos, 41.59°S 71.5°W, 640 m, 15 Jan 1986, R.T. Schuh and N.I. Platnick, 1♀ (AMNH_ENT 00023413) (AMNH). **Tucuman:** 15 km NW of Tafi del Valle, 26.77°S 65.79°W, 2800 m, 02 Jan 1982–03 Jan 1982, R.T.Schuh and B. Massie, 15♂ (AMNH_ENT 00023401–AMNH_ENT 00023402, AMNH_ENT 00023494–AMNH_ENT 00023496, AMNH_ENT 00023983, AMNH_ENT 00023996), 14♀ (AMNH_ENT 00023403–AMNH_ENT 00023404, AMNH_ENT 00023498–AMNH_ENT 00023499, AMNH_ENT 00023983, AMNH_ENT 00023996), 52♂ (AMNH_ENT 00022745–AMNH_ENT 00022796), 36♀ (AMNH_ENT 00022797–AMNH_ENT 00022831, AMNH_ENT 00022839) (AMNH). 1♂ (AMNH_ENT 00022906), 1♀ (AMNH_ENT 00022838) (EELM). 4♂ (AMNH_ENT 00023782–AMNH_ENT 00023785), 6♀ (AMNH_ENT 00023789–AMNH_ENT 00023794) (JTPC). 2♂ (AMNH_ENT 00022904, AMNH_ENT 00022905), 2♀ (AMNH_ENT 00022836, AMNH_ENT 00022837) (MACN). 2♂ (AMNH_ENT 00022907, AMNH_ENT 00022908) (MNNC). 2♂ (AMNH_ENT 00022902, AMNH_ENT 00022903), 2♀ (AMNH_ENT 00022834, AMNH_ENT 00022835) (IMLA). 2♂ (AMNH_ENT 00022900, AMNH_ENT 00022901), 2♀ (AMNH_ENT 00022832, AMNH_ENT 00022833) (USNM). 28 km SE of Amaicha del Valle, 26.74°S 65.76°W, 2800 m, 02 Jan 1982, R. T. Schuh and B. M. Massie, 1♂ (AMNH_ENT 00023405), 2♀ (AMNH_ENT 00023406, AMNH_ENT 00023407) (AMNH). 1♀

(AMNH_ENT 00023500) (MNNC). El Infiernillo (31 km E of Amaicha del Valle on Rt 307), 26.5997°S 65.6039°W, 3030 m, 21 Feb 1993, R. T. Schuh and J. T. Polhemus, 1♂ (AMNH_ENT 00023409), 2♀ (AMNH_ENT 00023410, AMNH_ENT 00023411) (AMNH). [Paso] Infernillo on Rt 307, 31 km E of Amaicha del Valle, 26.74°S 65.76°W, 3030 m, 21 Feb 1983, R. T. Schuh, J. T. Polhemus, 1♂ (AMNH_ENT 00023982), 1♀ (AMNH_ENT 00023982), 10 nymphs (AMNH_ENT 000-23982), 18♂ (AMNH_ENT 00022840–AMNH_ENT 00022857), 23♀ (AMNH_ENT 00022861–AMNH_ENT 00022874, AMNH_ENT 000-22878, AMNH_ENT 00022880–AMNH_ENT 00022887) (AMNH). 2♂ (AMNH_ENT 00022859, AMNH_ENT 00022860), 2♀ (AMNH_ENT 00022876, AMNH_ENT 00022877) (IMLA). 1♂ (AMNH_ENT 000-22858), 1♀ (AMNH_ENT 00022875) (USNM). **CHILE: Bio-Bio - Region VIII:** ***Biobio Prov.:*** 4 km E of El Abanico, 37.33°S 71.47°W, 938 m, 21 Nov 1981, R.T. Schuh and N.I. Platnick, 5♂ (AMNH_ENT 00023396–AMNH_ENT 00023397, AMNH_ENT 000-23491–AMNH_ENT 00023493), 4♀ (AMNH_ENT 00023398–AMNH_ENT 00023400, AMNH_ENT 00023497), 1♀ (AMNH_ENT 00022892) (AMNH). 4 km E of El Abanico, 37.33°S 71.47°W, 950 m, 21 Nov 1981, R.T. Schuh and N.I. Platnick, 2♂ (AMNH_ENT 00023981, AMNH_ENT 00023985), 7♂ (AMNH_ENT 00022909–AMNH_ENT 00022-915), 4♀ (AMNH_ENT 00022918–AMNH_ENT 00022921) (AMNH). 3♂ (AMNH_ENT 00023786–AMNH_ENT 00023788), 4♀ (AMNH_ENT 00023795–AMNH_ENT 00023798) (JTPC). 2♂ (AMNH_ENT 00022916, AMNH_ENT 00022917) (MNNC). **Los Lagos - Region X:** ***Osorno Prov.:*** Maicolpue, S of Bahia Mansa, 40.6053°S 73.7419°W, 26 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00023984), 1♀ (AMNH_ENT 000-23984), 3♂ (AMNH_ENT 00022930–AMNH_ENT 00022932), 2♀ (AMNH_ENT 00022933, AMNH_ENT 00022934) (AMNH). ***Palena Prov.:*** Chaiten, 42.92144°S 72.71462°W, 17 Jan 1986, R.T. Schuh and N.I. Platnick, 1♂ (AMNH_ENT 00022897) (AMNH). **Maule - Region VII:** ***Curico Prov.:*** Vegas de Vagara, Rio Teno, 34.98333°S 71.38333°W, 2700 m, 20 Jan 1964, L. E. Peña, 1♂ (AMNH_ENT 00022896) (AMNH).

OTHER SPECIMENS EXAMINED: **ARGENTINA: Neuquen:** Lago Lacar, Hua Hum, 40.14445°S 71.62194°W, 650 m, 13 Jan 1986, R.T. Schuh and N.I. Platnick, 1 nymph (AMNH_ENT 00023966) (AMNH). **Tucuman:** 15 km NW of Tafi del Valle, 26.77°S 65.79°W, 2800 m, 02 Jan 1982–03 Jan 1982, R.T.Schuh and B. Massie, 11 nymphs (AMNH_ENT 00023983, AMNH_ENT 000-23995–AMNH_ENT 00023996) (AMNH). **CHILE: Bio-Bio - Region VIII:** ***Biobio Prov.:*** 4 km E of El Abanico, 37.33°S 71.47°W, 950 m, 21 Nov 1981, R.T. Schuh and N.I. Platnick, 3 nymphs (AMNH_ENT 00023981, AMNH_ENT 00023985) (AMNH). **Los Lagos - Region X:** ***Osorno Prov.:*** Maicolpue, S of Bahia Mansa, 40.6053°S 73.7419°W, 26 Jan 1986, R.T. Schuh and N.I. Platnick, 5 nymphs (AMNH_ENT 00023984) (AMNH).

Pseudosaldula salina, new species
Plates 4, 6; figures 1, 15; map 11

DIAGNOSIS: Relatively small, always macropterous; antennal segment 1 with a black stripe ventrolaterally; all tibiae with a more or less well-defined black stripe on the dorsal surface; lateral margins of pronotum straight, subparallel, costal margin of hemelytra straight, providing a less distinctly oval appearance than in all other known *Pseudosaldula* spp.; dorsal vestiture sparse, short, recumbent, matching background coloration. Some specimens with distinctly reddish coloration. Black stripe on antennal segment 1 similar to condition in *P. chilensis* and *P. penai*, but both of those species with golden setae on the dorsum, the former species with a black stripe also dorsomedially on antennal segment 1, the latter species lacking the black stripe on the dorsal surface of the tibiae. Similar in appearance to members of the Chiloxanthinae such as *Paralosalda innova*.

DESCRIPTION: *Male*: Total length 3.52, width pronotum 1.24. COLORATION (pl. 4): Pronotum narrowly pale laterally; hemelytron dark, with extensive pale areas, with cells weakly darkened, darker basally; clavus, adjacent endocorium, posterolateral portion of endocorium, and usually stripe on exocorium along embolium dark; antennal segment 1 pale with a black stripe ventrolaterally, apex of segment 2 pale, remainder of

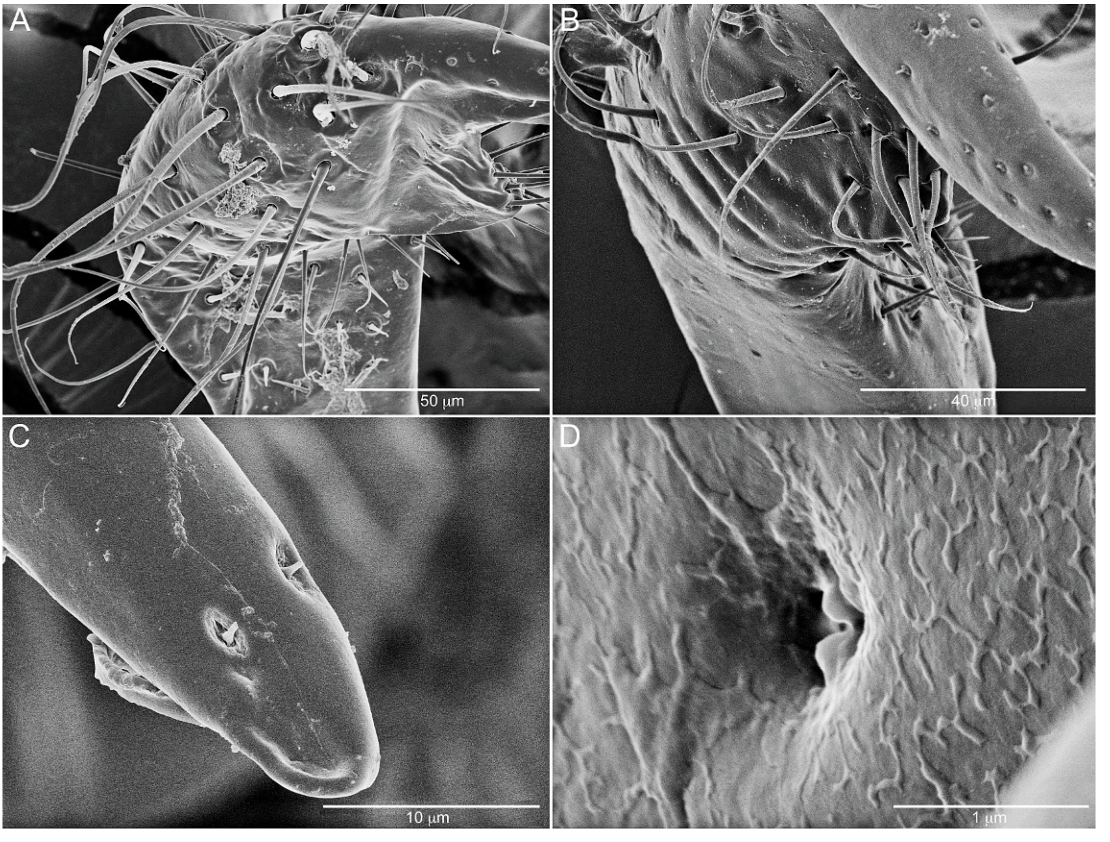


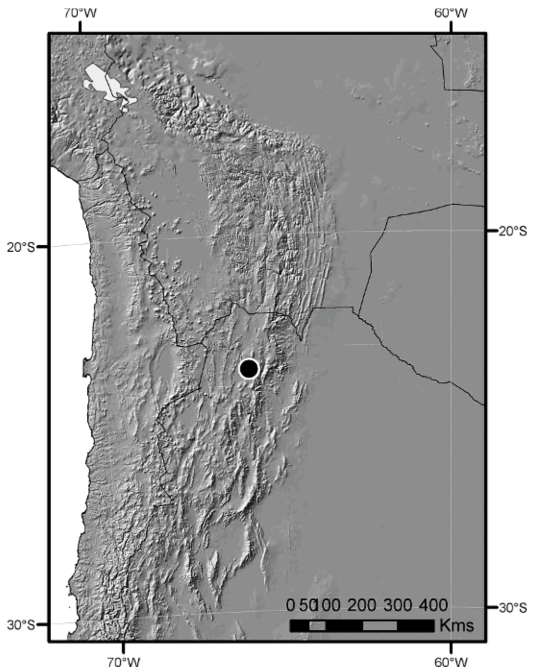
Fig. 15. *Pseudosaldula salina* (scanning electron micrographs): Left paramere. **A.** View of ventral face at level of processus sensualis. **B.** Medioventral view of setae on processus sensualis. **C.** Apex of left paramere showing short setiform sensors. **D.** Detail of gland pore on paramere.

segment 2 and segments 3 and 4 darkened; legs, including coxae, largely pale, weakly darkened, forefemur black on ventral surface. SURFACE AND VESTITURE (pl. 4): Head, pronotum, and scutellum finely granular, barely shining; hemelytron dull, without pruinose areas. Vestiture of dorsum with numerous, short to moderate length, recumbent, dark setae; membrane with sparse short setae on veins. STRUCTURE (pl. 4): Known only from macropterous forms; body elongate, nearly parallel sided, somewhat compressed; head lacking neck, drawn into pronotum. **Thorax**: Pronotum trapezoidal, appearing relatively short, with lateral margins nearly straight, only weakly converging anteriorly. *Hemelytra*: Membrane of forewing with cell 5 long, fully formed, approaching length of cell 4. GENITALIA (figs. 1, 15A–C): **Parandria**: Inner sclerotized margin smoothly rounded; posterior margin weakly curving, with medial moundlike protrusion. **Parameres**: Processus sensualis with 10–15 setae.

Female (pl. 4): Total length 3.39, width pronotum 1.16. COLORATION (pl. 4): As in male; subgenital plate distally pale, translucent, margin sinuate. SURFACE AND VESTITURE (pl. 4): As in male, except membrane completely devoid of setae. STRUCTURE: **Abdomen**: See generic description. GENITALIA: See generic description.

ETYMOLOGY: Named for its occurrence in a saline environment, from the Latin *salinus*, "salty".

DISTRIBUTION: Jujuy Province, northern Argentina, near the margin of the Salinas Grandes, one of the immense salt lakes on the high Andean plateau.



Map 11. Distribution of *Pseudosaldula salina*.

HABITAT DATA AND ALTITUDINAL RANGE: Known from a single locality at 3440 meters. Available specimens were collected on sparsely vegetated muskeglike area around a small saline pond; soil with some crusted salt.

DISCUSSION: This taxon is unlike most species of *Pseudosaldula* in the conformation of the head and pronotum, which look very much like the form seen in some members of the Chiloxanthinae, and the complete lack of pruinosity and shining setae on the dorsum. The coloration of many specimens is strongly reddish, a phenomenon that may be associated with life in saline habitats.

HOLOTYPE: **ARGENTINA: Jujuy:** 9 km W jct Rts 40 & 52 on E side of Salinas Grandes, 23.56666°S 65.83333°W, 3440 m, 16 Feb 1993, R. T. Schuh and J. T. Polhemus, 1♂ (AMNH_ENT 00023414) (AMNH).

PARATYPES: **ARGENTINA: Jujuy:** 9 km W jct Rts 40 & 52 on E side of Salinas Grandes, 23.56666°S 65.83333°W, 3440 m, 16 Feb 1993, R. T. Schuh and J. T. Polhemus, 6♂ (AMNH_ENT 00023415–AMNH_ENT 00023418, AMNH_ENT 00023501–AMNH_ENT 00023502), 3♀ (AMNH_ENT 00023419–AMNH_ENT 00023420, AMNH_ENT 00023505) (AMNH). 11♂ (AMNH_ENT 00023503–AMNH_ENT 00023504, AMNH_ENT 00024026–AMNH_ENT 00024034), 7♀ (AMNH_ENT 00023506, AMNH_ENT 00024036–AMNH_ENT 00024041) (JTPC). 2♂ (AMNH_ENT 00024024, AMNH_ENT 00024025), 1♀ (AMNH_ENT 00024035) (IMLA).

OTHER SPECIMENS EXAMINED: **ARGENTINA: Jujuy:** 9 km W jct Rts 40 & 52 on E side of Salinas Grandes, 23.56666°S 65.83333°W, 3440 m, 16 Feb 1993, R. T. Schuh and J. T. Polhemus, 1 nymph (AMNH_ENT 00024042) (JTPC).

Pseudosaldula saxicola, new species
Plates 4, 6, 8A, B; figures 1, 3, 16, 17; map 12

DIAGNOSIS: Recognized by the campanulate pronotum with a moderately concave to nearly straight lateral margin, the dorsal vestiture composed of reclining, mostly golden, simple setae of moderate length, and the posterolateral angle of the corium usually with a conspicuous large pale macula. Most similar to *P. antioquia* and *P. yungas* in pronotal structure and lack of pruinose areas on the hemelytra, but the former species consistently smaller, with only black, suberect, simple setae on the hemelytra, and with a more northerly distribution, and the latter species of similar size and southerly distribution but with only long, erect, black setae on hemelytra, as readily seen in lateral view.

DESCRIPTION: *Male*: Total length 3.81, width pronotum 1.32. COLORATION (pl. 4; fig. 16): Hemelytron generally dark with extensive pale maculations, cells of membrane weakly to heavily darkened; hemelytron consistently with a large white maculation posteriorly on exocorium; antennal segments 1 and 2 pale to weakly darkened, segments 3 and 4 more heavily darkened; legs, including coxae, largely pale with scattered dark spots; apex of foretibia with a narrow, contrasting, dark band. SURFACE AND VESTITURE (pl. 4): Hemleytra mostly dull, without pruinose areas, claval commissure partially polished. Vestiture of dorsum with numerous recumbent golden, shining setae, without long dark setae; veins of membrane with a few short dark setae. STRUCTURE (pl. 4; fig. 16):

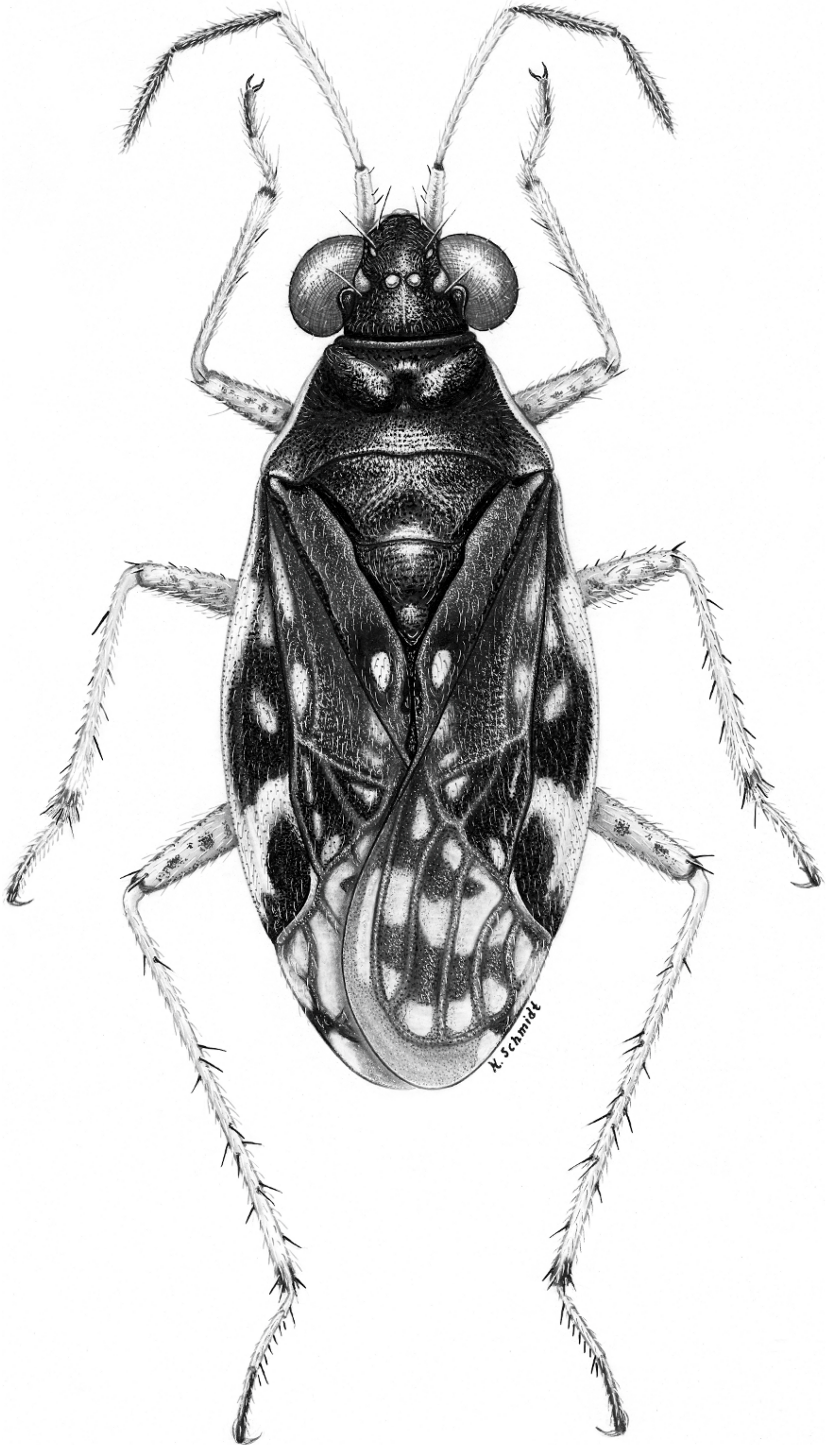


Fig. 16. Habitus of *Pseudosaldula saxicola*.

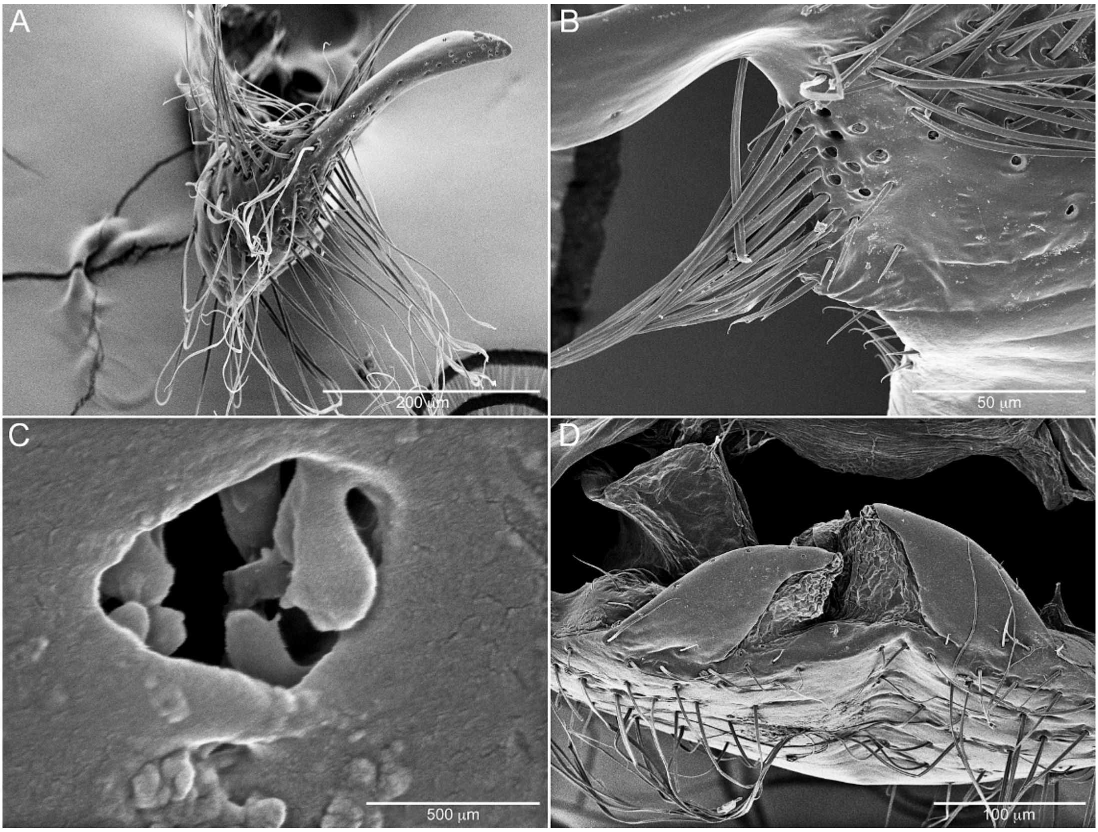


Fig. 17. *Pseudosaldula saxicola* (scanning electron micrographs). Right paramere. **A.** Apical view showing comblike arrangement of long setae. **B.** Medioventral view of setae on processus sensualis. **C.** Detail of gland pore on paramere. **D.** Dorsal view of parandria.

Known from macropterous and submacropterous forms, body broadest at about level of midpoint of claval commissure, not so distinctly ovoid as in many species of *Pseudosaldula*. **Thorax**: Pronotum campanulate, lateral margins weakly concave, rarely straight. *Hemelytra*: Cells of membrane long, fully formed, cell 5 distinctly shorter than 4. GENITALIA (figs. 1, 3, 17A, B, D): **Parandria**: Inner sclerotized margin appearing smoothly rounded with transmitted light, sinuous with scanning electron microscopy (fig. 17D); posterior margin weakly curving. **Parameres**: Processus sensualis with ~40 setae; paramere body broad at level of processus sensualis.

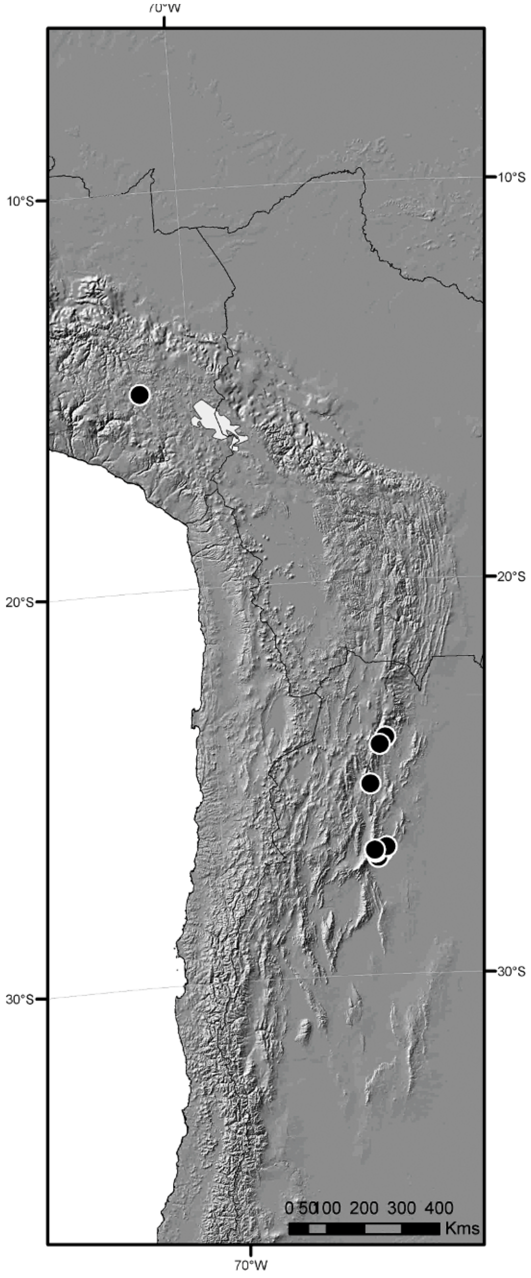
Female (pl. 4): Total length 4.23, width pronotum 1.47. COLORATION (pl. 4): As in male; subgenital plate distally dark, translucent. SURFACE AND VESTITURE (pl. 4): As in male. STRUCTURE: **Abdomen**: See generic description. GENITALIA: See generic description.

ETYMOLOGY: Named for its habit of living on stones, usually in streams, from the Latin *saxicolus*, "rock loving".

HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between 1000–3500 meters. Available habitat data indicate specimens were collected on seeping vertical rock faces or on large rocks in forest streams.

DISTRIBUTION: Known from Tucuman, Salta, and Jujuy provinces in northern Argentina as well as from Cuzco Department, Peru.

DISCUSSION: All specimens from Argentina are macropterous, whereas the single specimen from Cuzco Department, Peru, is submacropterous or brachypterous.



Map 12. Distribution of *Pseudosaldula saxicola*.

HOLOTYPE: **ARGENTINA: Tucuman:** 21 km E of Tafi del Valle, 26.9°S 65.5°W, 1715 m, 21 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♂ (AMNH_ENT 00023394) (AMNH). 27 km NW of Monteros, 27.03°S 65.64°W, 1000 m, 03 Jan 1982, R.T.Schuh and B. Massie, 1♂ (AMNH_ENT 00023425) (AMNH).

PARATYPES: **ARGENTINA: Jujuy:** 20 km N of Jujuy, 24°S 65.3°W, 2000 m, 11 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 2♂ (AMNH_ENT 00023507, AMNH_ENT 00023996), 3♀ (AMNH_ENT 00023432, AMNH_ENT 00023521, AMNH_ENT 00023996) (AMNH). between Laguna de Yala/Rt 9, just NW of Jujuy, 24.178°S 65.465°W, 1835 m, 10 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 3♂ (AMNH_ENT 00023429, AMNH_ENT 00023513, AMNH_ENT 00023515), 2♀ (AMNH_ENT 00023527, AMNH_ENT 00023528) (AMNH). 1♂ (AMNH_ENT 00023514) (IMLA). **Salta:** just above Escoipe on Rt 33, 25.174°S 65.7645°W, 2120 m, 19 Feb 1993, R. T. Schuh and J. T. Polhemus, 9♂ (AMNH_ENT 00023388–AMNH_ENT 00023391, AMNH_ENT 00023426, AMNH_ENT 00023508–AMNH_ENT 00023511), 3♀ (AMNH_ENT 00023522–AMNH_ENT 00023524) (AMNH). 16♂ (AMNH_ENT 00023392, AMNH_ENT 00024043–AMNH_ENT 00024057), 13♀ (AMNH_ENT 00024058–AMNH_ENT 00024070) (JTPC). 1♂ (AMNH_ENT 00023512), 1♀ (AMNH_ENT 00023526) (IMLA). 1♀ (AMNH_ENT 00023525) (USNM). **Tucuman:** 21 km E of Tafi del Valle, 26.9°S 65.5°W, 1715 m, 21 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 2♂ (AMNH_ENT 00023393, AMNH_ENT 00023427), 4♀ (AMNH_ENT 00023395, AMNH_ENT 00023428, AMNH_ENT 00023518–AMNH_ENT 00023519) (AMNH). 1♀ (AMNH_ENT 00023520) (USNM). 27 km NW of Monteros, 27.03°S 65.64°W, 1000 m, 03 Jan 1982, R.T.Schuh and B. Massie, 3♂ (AMNH_ENT 00023628, AMNH_ENT 00023947), 2♀ (AMNH_ENT 00023947), 3♂ (AMNH_ENT 00022966–AMNH_ENT 00022967, AMNH_ENT 00022970) (AMNH). 1♂ (AMNH_ENT 00023834), 1♀ (AMNH_ENT 00023836) (JTPC). 1♂ (AMNH_ENT 00022971) (IMLA). 2♂ (AMNH_ENT 00022968, AMNH_ENT 00022969) (USNM). 29 km NW of Monteros, 27.04°S 65.62°W, 1000 m, 03 Jan 1982, R. T. Schuh, B. M. Massie, 1♀ (AMNH_ENT 00023433) (AMNH). 36 km NW of Monteros, 26.91°S 65.69°W, 1300 m, 03 Jan 1982, R.T.Schuh and B. Massie, 2♂

(AMNH_ENT 00023949), 6♀ (AMNH_ENT 00023422–AMNH_ENT 00023423, AMNH_ENT 00023516–AMNH_ENT 00023517, AMNH_ENT 00023949), 6♂ (AMNH_ENT 00022959, AMNH_ENT 00022961–AMNH_ENT 00022965), 5♀ (AMNH_ENT 00022954–AMNH_ENT 00022958) (AMNH). 1♂ (AMNH_ENT 00023835), 1♀ (AMNH_ENT 00023837) (JTPC). 1♂ (AMNH_ENT 000-22960) (IMLA). Cerro San Javier, 26.7833°S 65.3833°W, 1041 m, 07 Apr 1950, P. Wygodzinsky, 1♂ (AMNH_ENT 00023430), 1♀ (AMNH_ENT 00023431) (AMNH). El Indio W of Acheral, Rio los Soza, 960 m, 21 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 1♂ (AMNH_ENT 00023948), 1♀ (AMNH_ENT 00023948) (AMNH). Tafí del Valle, 26.85464°S 65.71341°W, 2000 m, 01 Oct 1957, Unknown, 1♀ (AMNH_ENT 00022953) (AMNH). **PERU: Cusco:** Choco, 15.0222°S 71.3089°W, 3500 m, 05 Aug 1965, P. and B. Wygodzinsky, 1♀ (AMNH_ENT 00023434) (AMNH).

OTHER SPECIMENS EXAMINED: **ARGENTINA: Jujuy:** 20 km N of Jujuy, 24°S 65.3°W, 2000 m, 11 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 8 nymphs (AMNH_ENT 00023997, AMNH_ENT 00023998) (AMNH). **Salta:** just above Escoipe on Rt 33, 25.174°S 65.7645°W, 2120 m, 19 Feb 1993, R. T. Schuh and J. T. Polhemus, 2 nymphs (AMNH_ENT 000-24071, AMNH_ENT 00024072) (JTPC). **Tucuman:** 27 km NW of Monteros, 27.03°S 65.64°W, 1000 m, 03 Jan 1982, R.T.Schuh and B. Massie, 3 nymphs (AMNH_ENT 00023947) (AMNH). 36 km NW of Monteros, 26.91°S 65.69°W, 1300 m, 03 Jan 1982, R.T.Schuh and B. Massie, 5 nymphs (AMNH_ENT 00023949) (AMNH). El Indio W of Acheral, Rio los Soza, 960 m, 21 Feb 1993, R.T. Schuh, J.T. Polhemus, E. Dominguez, 5 nymphs (AMNH_ENT 00023948) (AMNH).

Pseudosaldula vulgaris, new species
Plates 5, 6; figures 1, 18, 19; map 13

DIAGNOSIS: Macropterous or brachypterous; dorsum uniformly and densely clothed with reclining, shining, golden setae intermixed with reclining black setae of moderate length, the latter readily visible on the lateral margin of the pronotum; veins of membrane in forewing with abundant setae as on corium; hemelytra dull, except for polished area along claval commissure, with extensive areas of pruinosity. Entirely dull hemelytra with reclining relatively short golden and black setae similar to condition found in *P. chilensis* and *P. penai*, but those species with a black stripe lateroventrally on antennal segment 1; dull hemelytra also similar to *P. bergi* and *P. pilosa*, but *P. bergi* lacking numerous, golden, shining setae, the extensive pruinose areas, and setae on the veins of the membrane as seen in *P. vulgaris*, and *P. pilosa* with long, erect, black, shaggy setae on the dorsum.

DESCRIPTION: *Male*: Total length 3.29, width pronotum 1.25. COLORATION (pl. 5): Hemelytron ranging from almost entirely dark with cells of membrane at least partially pale and corium and clavus with extensive pruinose areas, to largely pale with only anterior two-thirds of clavus and base of corium dark and with pruinose areas appearing almost white; antennal segments 1 and 2 pale to weakly darkened, segments 3 and 4 more strongly darkened; legs, including at least apical portion of coxae, largely pale with some areas of infuscation. SURFACE AND VESTITURE (pl. 5; fig. 18D): Hemelytron dull except for polished, shining area along claval commissure. Vestiture of the dorsum consisting of medium length reclining black setae intermixed with golden shining setae, the former also on veins of membrane. STRUCTURE (pl. 5; fig. 18): Known from macropterous and brachypterous forms, body ranging from ovoid in the former to teardrop shaped in the latter. **Thorax**: Pronotum with lateral margins straight to weakly convex, distinctly narrowing anteriorly. *Hemelytra*: Membrane of forewing usually with five distinct cells, even in brachypterous forms. GENITALIA (figs. 1, 19): **Parandria** (figs. 1, 19D): Inner sclerotized margin nearly straight, angled posterolaterally; posterior margin nearly straight. **Parameres**: Processus sensualis with 10–15 setae.

Female (pl. 5): Total length 3.49, width pronotum 1.33. COLORATION (pl. 5): As in male; subgenital plate pale distally, translucent. SURFACE AND VESTITURE

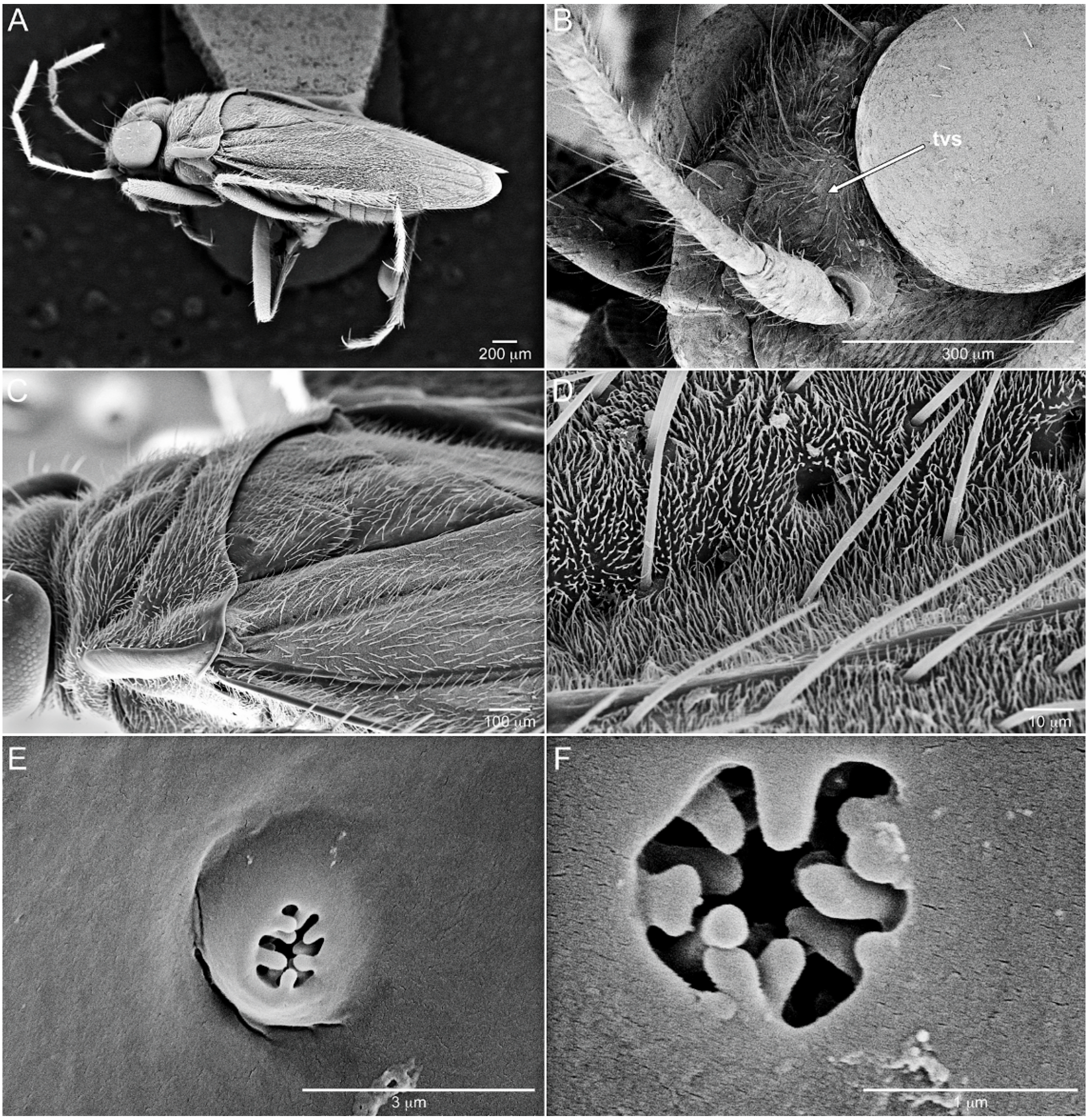


Fig. 18. *Pseudosaldula vulgaris* (scanning electron micrographs). **A.** Lateral view of whole specimen using backscatter electrons. **B.** Frontolateral view of face showing condition of transverse swelling across base of clypeus. **C.** Lateral view of pronotum, scutellum, and base of hemelytron. **D.** Detail of clavus and row of punctures along claval suture, showing suberect simple setae and microtricha. **E.** Perspective view of gland pore on paramere. **F.** Detail of gland pore on paramere. **tvs,** transverse swelling.

(pl. 5): As in male; macropterous and brachypterous forms with setae on veins of membrane. STRUCTURE: Known from macropterous and brachypterous forms. **Abdomen**: See generic description. GENITALIA: See generic description.

ETYMOLOGY: Named for its relatively widespread and abundant occurrence in the Peruvian Andes, from the Latin *vulgaris*, "common".

HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between 2300–3800 meters, with many of the specimens coming from altitudes in excess of 3000 meters. Available habitat data indicate that about 60% of known collecting localities are montane

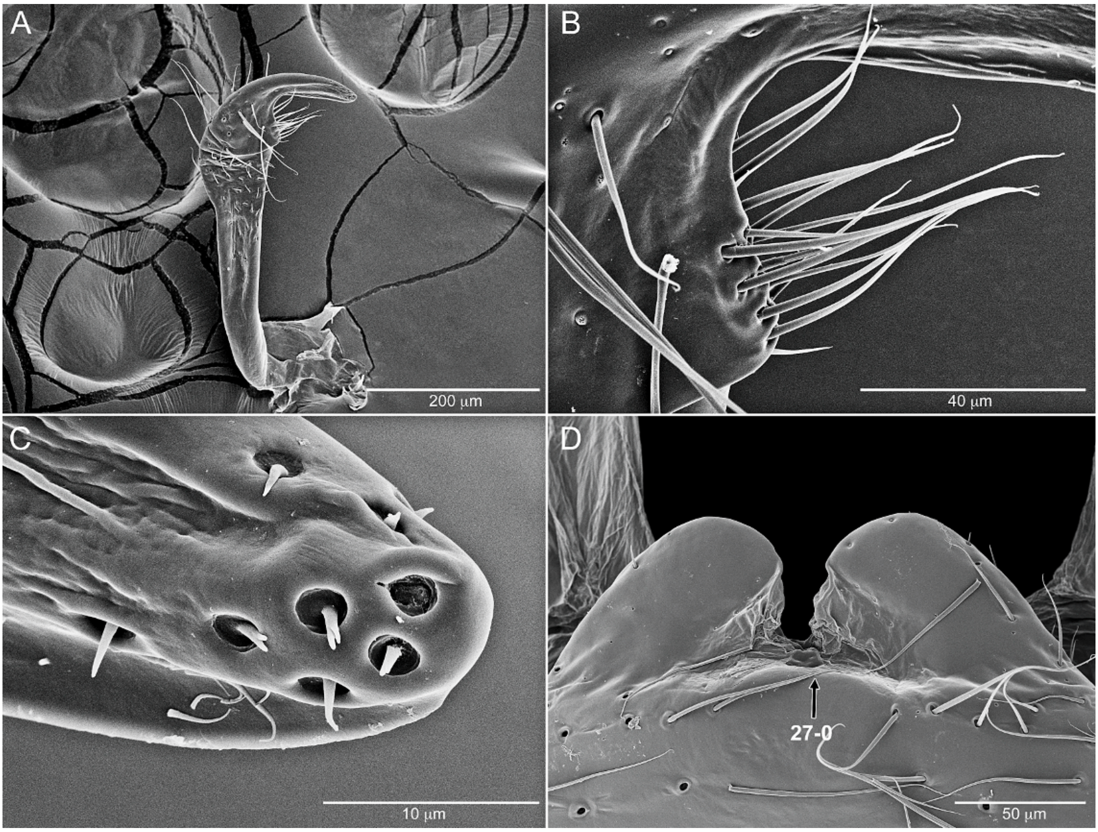


Fig. 19. *Pseudosaldula vulgaris* (scanning electron micrographs). Left paramere. **A.** General view of ventral face. **B.** Detail of processus sensualis. **C.** Apex of paramere showing short setiform sensors. **D.** Dorsal view of parandria.

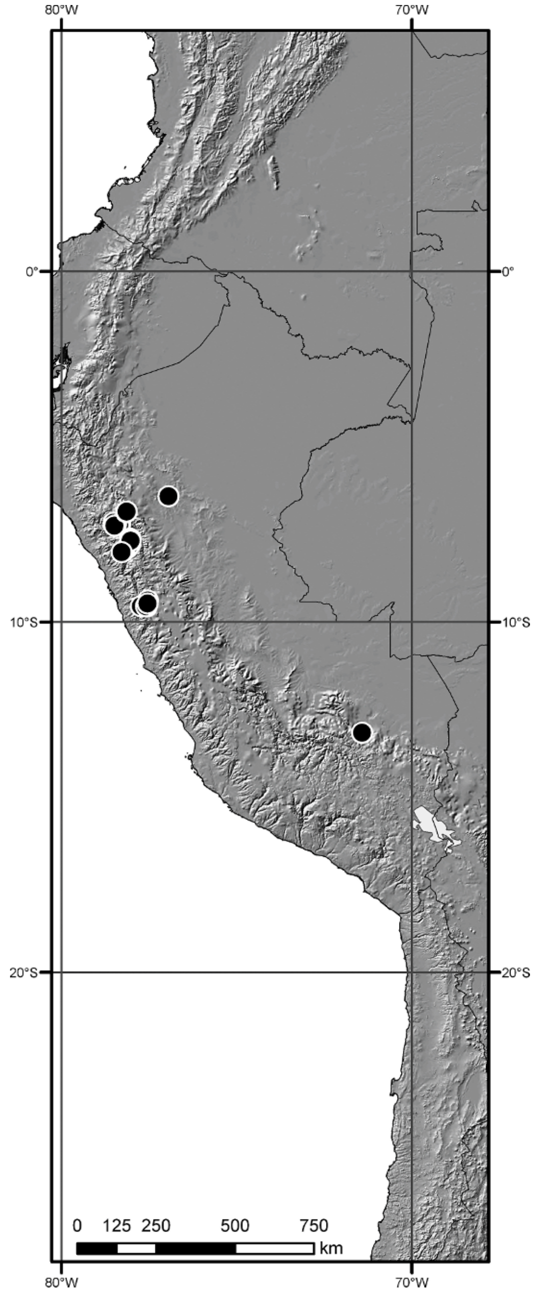
seeps with extensive cover of short vegetation; about 15% of localities were sandy stream margins with some vegetative cover, with another 15% were on the margins of ponds or small lakes, also with substantial vegetative cover. Although the remaining 10% of the localities are not easily characterized, nearly all had some vegetative cover on the substrate.

DISTRIBUTION: Known from Amazonas Department, Peru, in the north to northern Bolivia in the south.

DISCUSSION: This in the most commonly collected species at high altitudes in the Andes of northern Peru. The types of habitats in which *P. penai* occurs in northern Argentina are very similar to those for *P. vulgaris* in northern Peru.

HOLOTYPE: **PERU: Ancash:** 15 km N of Huaraz, 9.3978°S 77.53333°W, 2780 m, 14 Jan 1976, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00023437) (AMNH).

PARATYPES: **PERU: Amazonas:** Molinopampa, 43 km E Chachapoyas, 6.41652°S 76.94229°W, 2300 m, 11 Jul 1972, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00023751), 2♀ (AMNH_ENT 00023762, AMNH_ENT 00023763) (JTPC). **Ancash:** 15 km N of Huaraz, 9.3978°S 77.53333°W, 2780 m, 14 Jan 1976, R.T. and J.C. Schuh, 15♂ (AMNH_ENT 00020457, AMNH_ENT 00020460–AMNH_ENT 00020473), 6♀ (AMNH_ENT 00019579–AMNH_ENT 00019584) (AMNH). Blw Punta Callan to W, 9.55524°S 77.69607°W, 3850 m, 16 Jan 1976, R.T. and J.C. Schuh, 2♂ (AMNH_ENT 00020458, AMNH_ENT 00020459), 1♀ (AMNH_ENT 00019824) (AMNH). Btwn Huaraz and Punta Callan, 9.56033°S 77.5729°W, 3440 m, 16 Jan 1976, R.T. and J.C. Schuh, 17♂ (AMNH_



Map 13. Distribution of *Pseudosaldula vulgaris*.

ENT 00023435, AMNH_ENT 00023436), 15♀, 71♂ (AMNH_ENT 00019749–AMNH_ENT 00019764, AMNH_ENT 00020367–AMNH_ENT 00020374, AMNH_ENT 000-20474–AMNH_ENT 00020481, AMNH_ENT 00020521–AMNH_ENT 00020559), 34♀ (AMNH_ENT 00019641–AMNH_ENT 00019651, AMNH_ENT 00019726–AMNH_ENT 00019748) (AMNH). 6♂ (AMNH_ENT 00019766–AMNH_ENT 00019768, AMNH_ENT 00020362–AMNH_ENT 00020364) (EELM). 1♀ (AMNH_ENT 00023756) (JTPC). 2♂ (AMNH_ENT 00019765, AMNH_ENT 00020375) (IMLA). Just E of Punta Callan, 9.55373°S 77.58575°W, 3800 m, 06 Jan 1976, R.T. and J.C. Schuh, 2♀ (AMNH_ENT 00023456, AMNH_ENT 00023457), 46♂ (AMNH_ENT 00020267–AMNH_ENT 000-20282, AMNH_ENT 00020438–AMNH_ENT 00020451, AMNH_ENT 00020560–AMNH_ENT 00020575), 39♀ (AMNH_ENT 000-19590–AMNH_ENT 00019627, AMNH_ENT 00019825) (AMNH). Monterrey, 5 km N of Huaraz, Rio Santa, 9.48179°S 77.54024°W, 2810 m, 14 Jan 1976, R.T. and J.C. Schuh, 13♀ (AMNH_ENT 00019628–AMNH_ENT 00019640), 23♂ (AMNH_ENT 00020283–AMNH_ENT 00020305) (AMNH). **Cajamarca:** 1 km E of Namora, near Cajamarca, 7.20493°S 78.32913°W, 2650 m, 19 Jan 1976, R.T. and J.C. Schuh, 2♂ (AMNH_ENT 00020306, AMNH_ENT 00020307), 1♀ (AMNH_ENT 00019652) (AMNH). 2♂ (AMNH_ENT 00023746, AMNH_ENT 00023747) (JTPC). 1 km W of Namora, nr Cajamarca, 7.2°S 78.34244°W, 2720 m, 19 Jan 1976, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00023455), 7♂ (AMNH_ENT 000-20308–AMNH_ENT 00020314), 55♀ (AMNH_ENT 00020138–AMNH_ENT 00020192) (AMNH). 10 km ESE of Llacanora, near Cajamarca, Laguna Suluscocha, 7.23458°S 78.34918°W, 2850 m, 19 Jan 1976, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00023439), 96♂ (AMNH_ENT 00020254–AMNH_ENT 00020259, AMNH_ENT 00020323–AMNH_ENT 00020361, AMNH_ENT 00020376–AMNH_ENT 00020398, AMNH_ENT 0002-0515–AMNH_ENT 00020520, AMNH_ENT 00020580–AMNH_ENT 00020601), 40♀ (AMNH_ENT 00019886–AMNH_ENT 00019907, AMNH_ENT 00020193–AMNH_ENT 00020210) (AMNH). 2♀ (AMNH_ENT 00023757, AMNH_ENT 00023758) (JTPC). 1♀ (AMNH_ENT 00020211) (MNNC). 2♀ (AMNH_ENT 00020212, AMNH_ENT 000-20213) (USNM). 11 km S of Cajabamba, 7.71465°S 78.0305°W, 2850 m, 20 Jan 1976, R.T. and J.C. Schuh, 3♂ (AMNH_ENT 000-

23444, AMNH_ENT 00023977), 2♀ (AMNH_ENT 00023445, AMNH_ENT 00023446), 38♂ (AMNH_ENT 00020215–AMNH_ENT 00020-243, AMNH_ENT 00020246–AMNH_ENT 00020250, AMNH_ENT 00020399–AMNH_ENT 00020402), 23♀ (AMNH_ENT 000-19653–AMNH_ENT 00019675) (AMNH). 3♂ (AMNH_ENT 00020251–AMNH_ENT 00020-253) (EELM). 1♂ (AMNH_ENT 00020244) (MNNC). 1♂ (AMNH_ENT 00020245) (USNM). 2 km W of Llacanora, nr Cajamarca, 7.20943°S 78.44278°W, 2530 m, 19 Jan 1976, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00023441), 2♀ (AMNH_ENT 00023442, AMNH_ENT 00023443), 39♂ (AMNH_ENT 00020007–AMNH_ENT 00020011, AMNH_ENT 00020404–AMNH_ENT 00020437), 35♀ (AMNH_ENT 00019780–AMNH_ENT 00019-792, AMNH_ENT 00019799–AMNH_ENT 00019820) (AMNH). 2♀ (AMNH_ENT 00019796, AMNH_ENT 00019797) (EELM). 1♂ (AMNH_ENT 00023752) (JTPC). 2♀ (AMNH_ENT 00019793, AMNH_ENT 000-19795) (MACN). 1♀ (AMNH_ENT 00019794) (MNNC). 1♀ (AMNH_ENT 00019798) (IMLA). 3 km S of Cajabamba, 7.62965°S 78.0401°W, 2600 m, 20 Jan 1976, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00023438), 4♂ (AMNH_ENT 00020012–AMNH_ENT 00020015), 1♀ (AMNH_ENT 00019826) (AMNH). Andes, Celendin Huaco, 6.866°S 78.147°W, 2625 m, 31 May 1936, F. Woytkowski, 2♂ (AMNH_ENT 00020365, AMNH_ENT 00020366) (AMNH). 1♀ (AMNH_ENT 00019588) (SEMC). Andes, Celendin Sandy Brook, 6.87°S 78.151°W, 2625 m, 25 May 1936, F. Woytkowski, 1♀ (AMNH_ENT 00019589) (SEMC). Andes, Rio Victoria Celendin Dungal, 6.856°S 78.135°W, 2625 m, 26 May 1936, F. Woytkowski, 2♀ (AMNH_ENT 00019586, AMNH_ENT 00019587) (SEMC). Rio Lallanga, vicinity of Llangua, 14 Jun 1936, F. Woytkowski, 1♀ (AMNH_ENT 00019585) (SEMC). above Cajamarca on Pacasmayo road, 7.17686°S 78.50992°W, 3100 m, 17 Jan 1976, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00023440), 1♀ (AMNH_ENT 000-19821) (AMNH). above Cajamarca on Pacasmayo road, 7.17857°S 78.50992°W, 3000 m, 17 Jan 1976, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00020016) (AMNH). above San Juan en route to Cajamarca, 7.25905°S 78.48961°W, 2620 m, 17 Jan 1976, R.T. and J.C. Schuh, 5♂ (AMNH_ENT 00020452–AMNH_ENT 00020456), 2♀ (AMNH_ENT 00019822, AMNH_ENT 00019823) (AMNH). **Cusco:** Paucartambo Suecia, 13.16667°S 71.41667°W, 1900 m, 23 Dec 1952, F. Woytkowski, 1♀ (AMNH_PBI 00180092) (AMNH). **Huanuco:** Huamincha, 1600 m, 01 Mar 1946, F. Woytkowski, 1♀ (AMNH_ENT 00023313) (AMNH). **La Libertad:** 12 km SW of Huamachuco, Rio Bado, 7.84866°S 78.09317°W, 3040 m, 21 Jan 1976, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00023447), 1♀ (AMNH_ENT 00023448), 27♂ (AMNH_ENT 00019930–AMNH_ENT 00019-956), 11♀ (AMNH_ENT 00019908–AMNH_ENT 00019918) (AMNH). 1♀ (AMNH_ENT 00019919) (MNNC). 1♀ (AMNH_ENT 00019716) (USNM). 14 km SW of Huamachuco, Rio Bado, 7.90256°S 78.12742°W, 3050 m, 21 Jan 1976, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00023452), 34♂ (AMNH_ENT 00019964–AMNH_ENT 00019982, AMNH_ENT 00020498–AMNH_ENT 00020512), 13♀ (AMNH_ENT 00019696–AMNH_ENT 000-19705, AMNH_ENT 00019723–AMNH_ENT 00019725) (AMNH). 3♂ (AMNH_ENT 000-19989–AMNH_ENT 00019991), 2♀ (AMNH_ENT 00019721, AMNH_ENT 00019722) (EELM). 1♂ (AMNH_ENT 00023744), 3♀ (AMNH_ENT 00023759–AMNH_ENT 00023-761) (JTPC). 2♂ (AMNH_ENT 00019985, AMNH_ENT 00019986), 1♀ (AMNH_ENT 00019718) (MACN). 1♂ (AMNH_ENT 00019983), 1♀ (AMNH_ENT 00019717) (MNNC). 2♂ (AMNH_ENT 00019987, AMNH_ENT 00019988), 2♀ (AMNH_ENT 00019719, AMNH_ENT 00019720) (IMLA). 1♂ (AMNH_ENT 00019984) (USNM). 20 km NE of Huamachuco, Laguna Cahuadan, 7.78134°S 78.03169°W, 3000 m, 20 Jan 1976, R.T. and J.C. Schuh, 3♂ (AMNH_ENT 00020092, AMNH_ENT 00023449, AMNH_ENT 00023973),1♀ (AMNH_ENT 00023973), 39♂ (AMNH_ENT 00020099–AMNH_ENT 00020137), 37♀ (AMNH_ENT 00019678–AMNH_ENT 00019695, AMNH_ENT 00019827–AMNH_ENT 00019845) (AMNH). 25 km S of Cajabamba, 7.6748°S 78.03022°W, 3000 m, 20 Jan 1976, R.T. and J.C. Schuh, 1♂ (AMNH_ENT 00020403), 2♀ (AMNH_ENT 00019676, AMNH_ENT 00019677) (AMNH). 25 km SW of Huamachuco, 7.97492°S 78.21998°W, 3480 m, 21 Jan 1976, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00023454), 23♂ (AMNH_ENT 000-20316–AMNH_ENT 00020322, AMNH_ENT 00020482–AMNH_ENT 00020497), 19♀ (AMNH_ENT 00019706–AMNH_ENT 00019715, AMNH_ENT 00019846–AMNH_ENT 00019854) (AMNH). 29 km SW of Huamachuco, 7.98091°S 78.23007°W, 3700 m, 21 Jan 1976, R.T. and J.C. Schuh, 2♀ (AMNH_ENT 00023450, AMNH_ENT 00023451), 2♂ (AMNH_ENT 00020513, AMNH_ENT 00020514), 1♀ (AMNH_ENT 00019855) (AMNH). 3♂ (AMNH_ENT 00023748–AMNH_ENT 00023750) (JTPC). 29 km SW of Huamachuco, 7.98091°S 78.23007°W, 3740 m, 21 Jan 1976, R.T. and J.C. Schuh, 2♂ (AMNH_ENT 00020090, AMNH_ENT 00020091), 7♂ (AMNH_ENT 00020260–AMNH_ENT 00020266), 7♀ (AMNH_ENT 00019856–AMNH_ENT 00019862) (AMNH). 30 km S of Cajabamba, 7.68501°S 78.02285°W, 3120 m, 20 Jan 1976, R.T. and J.C. Schuh, 1♀ (AMNH_ENT 00023453), 7♂ (AMNH_ENT 00019957–AMNH_ENT 00019963) (AMNH). 31 km S of Cajabamba, 7.69085°S 78.02727°W, 3175 m, 20 Jan 1976, R.T. and J.C. Schuh, 15♂ (AMNH_ENT 00019992–AMNH_ENT 00020006), 11♀ (AMNH_ENT 00019769–AMNH_ENT 00019779) (AMNH). 33 km SW if Huamachuco, 8.01081°S 78.2795°W, 3880 m, 21 Jan 1976, R.T. and J.C. Schuh, 2♀ (AMNH_ENT 00019863, AMNH_ENT 00019864) (AMNH).

OTHER SPECIMENS EXAMINED: **PERU: Ancash:** Blw Punta Callan to W, 9.55651°S 77.72776°W, 2920 m, 16 Jan 1976, R.T. and J.C. Schuh, 4 nymphs (AMNH_ENT 00023972) (AMNH). Btwn Huaraz and Punta Callan, 9.56033°S 77.5729°W, 3440 m, 16 Jan 1976, R.T. and J.C. Schuh, 6 nymphs (AMNH). Monterrey, 5 km N of Huaraz, Rio Santa, 9.48179°S 77.54024°W, 2810 m, 14 Jan 1976, R.T. and J.C. Schuh, 20 nymphs (AMNH_ENT 00023975, AMNH_ENT 00023978) (AMNH). **Cajamarca:** 10 km ESE of Llacanora, near Cajamarca, Laguna Suluscocha, 7.23458°S 78.34918°W, 2850 m, 19 Jan 1976, R.T. and J.C. Schuh, 10 nymphs (AMNH_ENT 00023971) (AMNH). 11 km S of Cajabamba, 7.71465°S 78.0305°W, 2850 m, 20 Jan 1976, R.T. and J.C. Schuh, 5 nymphs (AMNH_ENT 00023977) (AMNH). 2 km W of Llacanora, nr Cajamarca, 7.20943°S 78.44278°W, 2530 m, 19 Jan 1976, R.T. and J.C. Schuh, 15 nymphs (AMNH_ENT 00023967) (AMNH). 3 km S of Cajabamba, 7.62965°S 78.0401°W, 2600 m, 20 Jan 1976, R.T. and J.C. Schuh, 3 nymphs (AMNH_ENT 00023974) (AMNH). **La Libertad:** 14 km SW of Huamachuco, Rio Bado, 7.90256°S 78.12742°W, 3050 m, 21 Jan 1976, R.T. and J.C. Schuh, 6 nymphs (AMNH_ENT 00023970) (AMNH). 20 km NE of Huamachuco, Laguna Cahuadan, 7.78134°S 78.03169°W, 3000 m, 20 Jan 1976, R.T. and J.C. Schuh, 30 nymphs (AMNH_ENT 00023960, AMNH_ENT 00023973) (AMNH). 25 km SW of Huamachuco, 7.97492°S 78.21998°W, 3480 m, 21 Jan 1976, R.T. and J.C. Schuh, 8 nymphs (AMNH_ENT 00023976) (AMNH). 29 km SW of Huamachuco, 7.98091°S 78.23007°W, 3740 m, 21 Jan 1976, R.T. and J.C. Schuh, 6 nymphs (AMNH_ENT 00023969) (AMNH).

Pseudosaldula yungas, new species
Plate 5; figures 1, 3, 20; map 14

DIAGNOSIS: Recognized by the campanulate pronotum with strongly concave lateral margin, the vestiture of the hemelytra composed of long, erect, black simple setae as seen in lateral view, and the large size. Most similar in pronotal structure to *P. antioquia* and *P. saxicola*, but the former species consistently smaller, with only black, suberect, simple setae of moderate length on the hemelytra, and with a more northerly distribution, and the latter species of similar size and distribution but with reclining, mostly golden setae of moderate length on the dorsum.

DESCRIPTION: *Male*: Total length 4.31, width pronotum 1.43. COLORATION (pl. 5): Hemelytron dark, with several pale maculations, including a contrasting ivory maculation apically on the exocorium; membrane cells partially darkened; antennal segment 1 pale to moderately darkened, segments 2–4 more strongly darkened, often black; legs, including coxae, largely pale, with some dark spots on femora and darkened areas on femora and tibiae; apex of foretibia with a narrow, contrasting dark band. SURFACE AND VESTITURE (pl. 5):

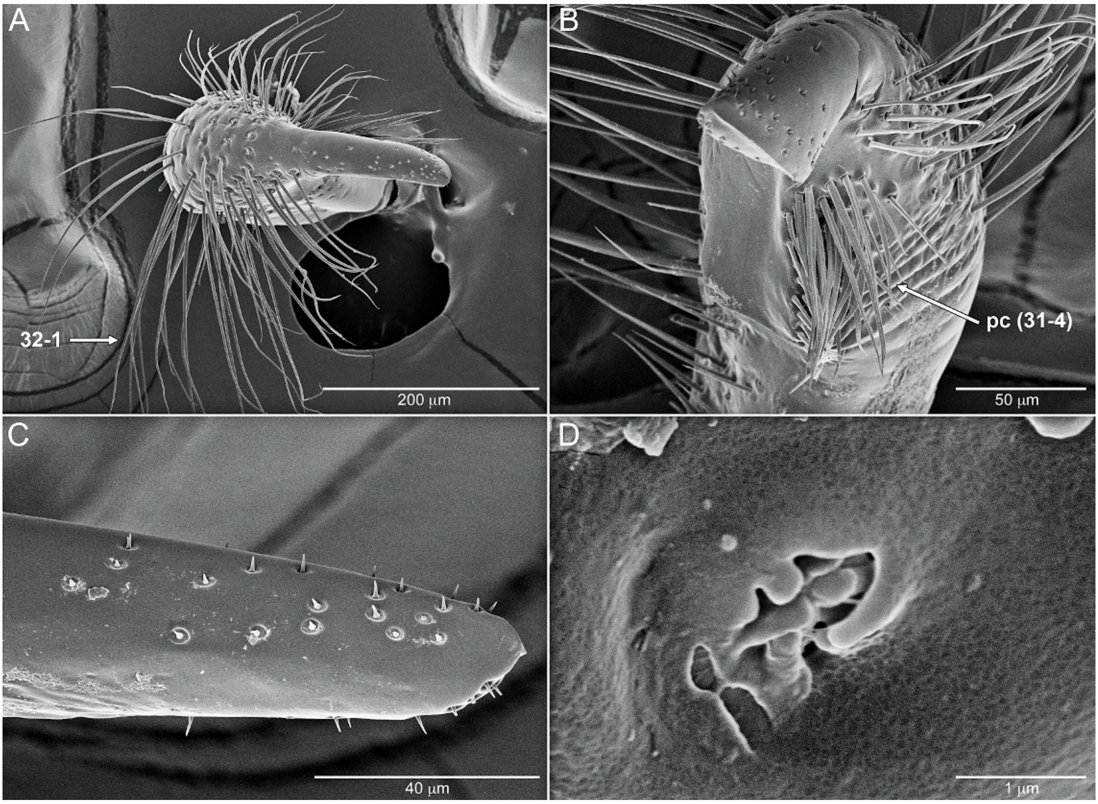


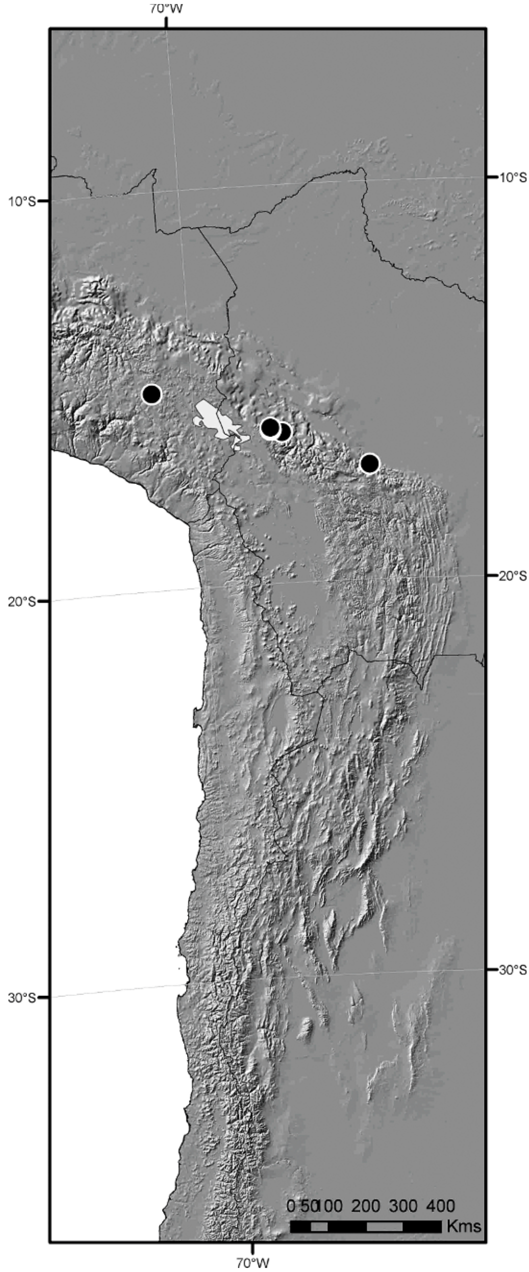
Fig. 20. *Pseudosaldula yungas* (scanning electron micrographs). Left paramere. **A.** Apical view showing comblike arrangement of long setae. **B.** Medial detail view of setae on processus sensualis. **C.** Apex of paramere showing short setiform sensors. **D.** Detail of gland pore on paramere.

Hemelytron smooth and dull, except posterior two-fifths of endocorium between cubital and radial veins and adjacent small area on exocorium polished and weakly shining; area of claval commissure narrowly polished on anterior half; hemelytron without pruinose areas. Vestiture of dorsum composed of moderately long, suberect, dark setae; membrane with sparse dark setae on veins. STRUCTURE (pl. 5): Known only from macropterous forms, body broadest at about level of midpoint of claval commissure, not so distinctly ovoid as in most *Pseudosaldula* spp. **Thorax**: Pronotum campanulate, lateral margins strongly concave. *Hemelytra*: Cells of membrane always fully formed. GENITALIA (figs. 1, 3, 20A–C): **Parandria** (fig. 1): Inner sclerotized margin nearly straight; posterior margin straight. **Parameres**: Processus sensualis with ~40 setae, body of paramere at level of processus sensualis distinctly broadened.

Female (pl. 5): Total length 4.21, width pronotum 1.52. COLORATION (pl. 5): As in male; subgenital plate distally pale, translucent. SURFACE AND VESTITURE (pl. 5): As in male. STRUCTURE: **Abdomen**: See generic description. GENITALIA: See generic description.

ETYMOLOGY: Named for its occurrence in the Yungas region of Bolivia; a noun in apposition.

HABITAT DATA AND ALTITUDINAL RANGE: Known to occur at altitudes between 1000–2000 meters. Available habitat data indicate specimens were collected on roadside seeps and near a swift stream, on the sides of boulders in the splash zone of very swift cold and clear stream, and on wet rock face and streamlet.



Map 14. Distribution of *Pseudosaldula yungas*.

DISTRIBUTION: Known from Cuzco Department, Peru south to the Yungas region of Bolivia.

DISCUSSION: The holotype and paratypes from the type locality above Yolosa (La Paz) are much larger and darker colored than the specimens from Chapare (Cochabamba). Nonetheless, all specimens possess long erect black setae on the dorsum, in distinct contrast to all specimens we are assigning to *P. saxicola*.

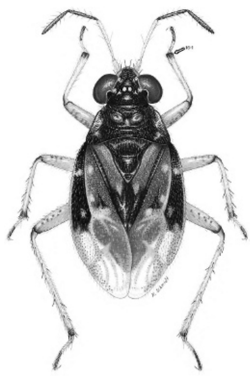
HOLOTYPE: **BOLIVIA: La Paz:** 4 km above Yolosa along Rio San Juan, 16.2°S 67.74°W, 1755 m, 06 Sep 1989, D. A. and J. T. Polhemus, 1♂ (AMNH_ENT 00023458) (USNM).

PARATYPES: **BOLIVIA: Cochabamba:** Chapare, El Palmar, 17.1°S 65.4833°W, 1000 m, 10 Jan 1958–18 Jan 1958, Monros and Wygodzinsky, 1♂ (AMNH_ENT 00023462), 1♀ (AMNH_ENT 00023463) (IMLA). **La Paz:** 2 km E of Estancia La Harca, Zongo Valley, 16.12°S 68.03°W, 1840 m, 05 Sep 1989, D. A. and J. T. Polhemus, 3♂ (AMNH_ENT 00023736, AMNH_ENT 00023999, AMNH_ENT 00024001), 2♀ (AMNH_ENT 000-23741, AMNH_ENT 00024000) (AMNH). 5♂ (AMNH_ENT 00023725–AMNH_ENT 00023729), 3♀ (AMNH_ENT 00023738–AMNH_ENT 00023740) (JTPC). 4 km above Yolosa along Rio San Juan, 16.2°S 67.74°W, 1755 m, 06 Sep 1989, D. A. and J. T. Polhemus, 3♀ (AMNH_ENT 00023459–AMNH_ENT 00023461) (JTPC). Valle Chuchulluni, centro, 16.06666°S 68.03333°W, 1800 m, 01 Jun 1980, W.H., 4♂ (AMNH_ENT 00023730–AMNH_ENT 00023733) (JTPC). Valle de Zongo, Harca Collina, 16.12°S 68.03°W, 2000 m, W.H., 2♂ (AMNH_ENT 00023734, AMNH_ENT 000-23735) (JTPC). **PERU: Cusco:** Aguas Calientes, 15.03194°S 71.04972°W, 4300 m, 07 Sep 1989, J. T. and D. A. Polhemus, 5♂ (AMNH_ENT 00023737, AMNH_ENT 00024014–AMNH_ENT 00024017), 3♀ (AMNH_ENT 00024018–AMNH_ENT 00024020) (JTPC).

OTHER SPECIMENS EXAMINED: **BOLIVIA: La Paz:** 2 km E of Estancia La Harca, Zongo Valley, 16.12°S 68.03°W, 1840 m, 05 Sep 1989, D. A. and J. T. Polhemus, 1 nymph (AMNH_ENT 00024002) (AMNH). **PERU: Cusco:** Aguas Calientes, 15.03194°S 71.04972°W, 4300 m, 07 Sep 1989, J. T. and D. A. Polhemus, 3 nymphs (AMNH_ENT 00024021–AMNH_ENT 00024023) (JTPC).

PART 2: PHYLOGENETIC AND BIOGEOGRAPHIC ANALYSES

Randall T. Schuh, Paola Pedraza, and John T. Polhemus



INTRODUCTION

In an effort to produce a more rigorous test of the monophyly of *Pseudosaldula*, to understand relationships within the genus, and to add rigor to our understanding of the biogeographical relationships within *Pseudosaldula*, we performed a phylogenetic analysis for the group. This effort included the use of morphological character data derived from the systematic work described in Part 1 as well as the acquisition of ~10 kb of DNA sequence data.

MATERIALS AND METHODS

Morphological Character Data

Our matrix comprising 36 morphological characters and 19 taxa is shown in table 2. The character descriptions are shown in table 3. These data represent the result of experimenting with a large number of alternative character codings, particularly for the male genitalia; in the end 14 of the characters were coded as multistate with 10 of those treated as additive where we judged there was evidence for analyzing the state transformation in this format (see table 2). The characters chosen represent a broad range of external morphology, particularly for structural attributes that show variation within *Pseudosaldula*, but also for some characters that are invariant within the group and help to document its monophyly. We have also included characters from late nymphal stages, but were not able to positively identify immature stages representing all species. For this reason unambiguous optimization of character data on cladograms does not always include nymphal data because of the rather large number of empty cells in the nymphal portion of our matrix. An extended discussion of certain morphological characters is provided below, over and above that given in Part 1.

Discussion of Selected Morphological Characters

The descriptions of most characters in table 3 should be adequate to understand the nature of the morphology analyzed. Nonetheless, we believe an amplified discussion of the following characters will help the reader understand our approach to coding certain of those characters and to clarify the nature of our observations.

Characters 1–3: The texture of the wing surface in *Pseudosaldula* varies from highly polished and shining to uniformly dull. Our examination of the hemelytral surface with scanning electron microscopy indicates that the dull hemelytra surface is made up of a dense field of microtrichia (figs. 7B, C, 9C, D), whereas the shining areas are devoid of microtrichia (fig. 5D).

Character 7: As in many members of the family Saldidae, the corium and clavus in many *Pseudosaldula* spp. include a number of pruinose spots, which are present only on dull hemelytral surfaces formed by a dense mat of microtrichia discussed above under characters 1–3 (figs. 7B, C, 9C, D, 18D). Our conclusion is that the pruinosity results from some specialized aspect of microtrichial structure, although we were not able to differentiate pruinose from nonpruinose areas in our SEM observations.

Character 8: In many members of the Saldoidini the degree and extent of pigmentation of the hemelytra may vary significantly, even within a population. *Pseudosaldula* is no exception in this regard. Most members of the tribe also have a white macula of greater or less extent in the posterolateral angle of the corium. This macula is present in all *Pseudosaldula* spp., but is more prominent in the group of species including *P. saxicola* (pl. 4), especially in those members of the group that do not show extremely heavy pigmentation.

Character 9: Lindskog and Polhemus (1992) used the nature of development of the "eyespot" along the radial vein as distinctive in the genus *Saldula*. The eyespot is seen as clearly developed in the outgroups *S. ablusa* and *S. coxalis*, but is also vaguely present in some species of *Pseudosaldula*, for example, in most known specimens of *P. salina* (pl. 4).

Character 10: Setae on the dorsum in Saldidae may be dull and inconspicuous in dried specimens when viewed from above, or they may coexist with shining, usually golden setae. *Pseudosaldula* spp. present a range of

TABLE 2
Matrix of morphological characters for *Pseudosaldula spp.*

		1111111111	2222222222	3333333
Character Number	0123456789	0123456789	0123456789	0123456
Additivity	---+---+--	-+-+-+-+--	+-+--+-+--	-------
Paralosalda_innova	0000000000	0003220000	1200000000	0000500
Saldula_stoneri	0000000000	1011000110	0010010000	000----
Saldula_laelaps	0100000101	0011001110	0021010000	000----
Saldula_coxalis	0000000000	0011211110	0100322111	1002000
Saldula_ablusa	0000000010	0011210110	0300322111	1002010
P_andensis	1112121101	1110101211	2111322210	020112-
P_aurea	0001011101	1100000210	0111322210	0301---
P_bergi	0100001101	0010000210	0121322210	0201120
P_bruesi	0111111101	1110001210	0111322210	0201---
P_chilensis	0000001101	1002211210	0000121210	0101122
P_huamachuco	0102021201	1110000210	0021322210	0401---
P_penai	0000001101	1001000210	0110121210	0101320
P_perula	0001031201	1110001210	0111221210	0301620
P_pilosa	0100001101	0210001210	0111322210	0201120
P_salina	0000001000	0011210210	1000322210	0201---
P_vulgaris	0000001201	1110000210	0111221310	0301420
P_antioquia	0101001011	0100101211	2110322210	0301---
P_saxicola	0000001011	1000001211	2000421310	0411321
P_yungas	0001001011	0210001211	2000421310	0411---

types of setae. When golden setae are present, they usually cover nearly the entire dorsum. These two types of setae are readily seen in dried specimens, although they are not evident in specimens immersed in alcohol; nor can they be readily distinguished through the use of scanning electron microscopy (figs. 9C, 18D).

Characters 17, 18: Our observations of the postclypeal region lead us to conclude that what Cobben referred to as a postclypeus is a medial extension of the transverse swelling sensu Parsons (1962). This theory receives support from the fact that in most Saldoidini the texture and coloration of the postclypeal region is the same as that for the transverse swelling. Furthermore, the median impressed line found in members of the Chiloxanthinae and Saldinae that we examined suggests a bilateral symmetry in conformity with derivation of the postclypeus from the bilaterally symmetrical transverse swelling.

As part of our phylogenetic analysis we have documented the transverse swelling with scanning micrographs in both the Chiloxanthinae and Saldoidini (Saldinae). The Chiloxanthinae, as represented by *Pentacora sphacelata* (Uhler) (fig. 21A) and *Paralosalda innova* Polhemus and Evans (fig. 21B, C), show that the texture of the postclypeal area does differ from that of the remainder of the face and that this area is weakly impressed along the longitudinal midline. The Saldinae currently comprises three tribes: Saldoidini, Saldini, and Saldunculini. The Saldoidini, as represented by the four species of *Saldula* examined by us (pl. 6), possess the condition described by Cobben (1959, 1960) in which the "postclypeus" appears as a medial transverse bar connecting the lateral portions of the transverse swelling (Parsons, 1962) across the dorsal (posterior) margin of the clypeus, and of the same color and texture as the transverse swelling across the entire face; as in the Chiloxanthinae, the postclypeal region is impressed at the midline. As we noted in the generic discussion, the extension of the transverse swelling across the posterior margin of the clypeus does not exist in *Pseudosaldula*, a condition also found in *Sinosalda*, also placed in the Saldoidini.

TABLE 3
Morphological Character Descriptions for *Pseudosaldula*

0 – Texture of clavus: (0) entirely dull; (1) polished on distal one-third or sometimes more.
1 – Texture of claval commissure: (0) partially dull; (1) partially polished and intensely shining; (2) entirely polished and intensely shining.
2 – Texture of endocorium: (0) entirely dull; (1) polished on posterior half.
3 – Texture of exocorium: (0) entirely dull; (1) polished only on embolar area or part thereof; (2) entirely polished, except sometimes apically.
4 – Texture of membrane: (0) dull to weakly polished; (1) polished.
5 – Texture of radial vein: (0) dull; (1) polished on posterior half; (2) polished over most of length; (3) polished on anterior half.
6 – Number of membrane cells: (0) four; (1) five.
7 – Pruinose areas on hemelytra: (0) absent; (1) obscure; (2) conspicuous.
8 – Ivory maculation at apex of corium: (0) absent or obscure; (1) present and well developed.
9 – Eyespot subbasally on exocorium: (0) conspicuously present; (1) obscure or absent.
10 – Golden setae on corium and clavus: (0) absent or present in very small numbers; (1) numerous and more or less uniformly distributed.
11 – Black setae on dorsum: (0) short, reclining; (1) moderate length, suberect; (2) long, erect, shaggy in appearance.
12 – Setae on veins of membrane: (0) absent or of very limited occurrence; (1) present, at least in brachypterous forms.
13 – Coloration of antennal segment 1: (0) pale or largely so; (1) pale with a single longitudinal black marking lateroventrally; (2) pale with two longitudinal black markings dark.
14 – Coloration of antennal segment 2: (0) largely pale; (1) infuscate; (2) black or nearly so.
15 – General coloration of foretibia: (0) pale; (1) with a black longitudinal stripe on dorsal surface (2) dark.
16 – Coloration of apex of foretibia: (0) without contrasting dark apical band; (1) apex of tibia with a dark, contrasting band.
17 – Condition of face at posterior margin of clypeus: (0) flat; (1) forming a continuation of the lateral transverse swelling and of distinct texture from surrounding region of face; (2) transverse swelling not extending across posterior margin of clypeus and texture as on surrounding face.
18 – Postclypeal area, subdivision: (0) subdivided longitudinally; (1) not subdivided.
19 – Pronotal shape: (0) flattened, broad; (1) campanulate.
20 – Lateral margins of pronotum: (0) weakly to conspicuously convex; (1) straight; (2) weakly to conspicuously concave.
21 – Coloration variation of hemelytra: (0) mostly heavily pigmented; (1) ranging from dark to largely pale; (2) mostly weakly pigmented mostly pale.
22 – Wing development: (0) always macropterous or submacropterous; (1) macropterous or brachypterous; (2) always brachypterous.
23 – Development of cells: (0) all cells present, close to fully formed; (1) cells reduced or eliminated; (2) cell 5 always narrowed and shortened.
24 – Parandria, shape of apex of projections: (0) elongate, tapering, acuminate; (1) apex quadrate, broad; (2) apex blunt, weakly broad; (3) apex rounded and coming to a point; (4) apex acuminate, straight laterally.
25 – Parandria, medial membrane: (0) absent; (1) present at base only; (2) covering entire medial margin.
26 – Parandria, condition of medial sclerotized margin: (0) parallel sided or nearly so; (1) straight, diverging toward base; (2) curvilinear.
27 – Parandria, condition of posterior margin: (0) straight across, relatively short; (1) concave, short; (2) nearly straight across, moderately elongate; (3) nearly straight across, elongate.
28 – Paramere body on ventral face at level of processus sensualis: (0) without projecting ventral margin, with setae; (1) with a projecting ventral margin, glabrous.
29 – Processus sensualis, condition of setal insertion: (0) setae arising from flat surrounding cuticle; (1) setae arising from nipplelike projections.
30 – Processus sensualis in the form of a mound: (0) sensory setae on flat surface of paramere; (1) sensory setae on low, moundlike elevation.
31 – Processus sensualis, clustering and number of setae: (0) 10–20 setae, scattered; (1) 10–15 setae in an ovoid proximal grouping; (2) 10–15 setae in a linear proximal grouping; (3) 20–25 setae in an ovoid distal grouping; (4) ~40 setae in an ovoid grouping.
32 – Length of setae on dorsal margin of paramere: (0) moderately long; (1) very long.
33 – Nymph, texture of dorsum: (0) smooth, not highly shining; (1) highly polished and shining; (2) granular.

TABLE 3
(Continued)

34 – Nymph, vestiture of dorsum: (0) short, appressed, black, numerous; (1) short, reclining, few black; (2) short, reclining, very few; (3) long, black, scattered; (4) long, black, numerous; (5) numerous, short, pale reclining and 2 rows submedial short black spines; (6) none.
35 – Nymph, coloration of dorsum: (0) uniformly pale mottled, largely pale; (1) entirely castaneous, sometimes with pale markings on abdomen.
36 – Nymph, pale markings laterally on abdomen: (0) none; (1) pale on A5; (2) pale on A5 and A6.

Examination of two species of *Salduncula*, representing the monogeneric Saldunculini, indicates that the face is not swollen laterally, that the area designated as the transverse swelling in *Saldula* is unicolorous with the surrounding face, and that there is no indication of a ''postclypeus'' in the sense that this term was used by Cobben. With regard to the condition in the Saldini, examination of *Salda alta* Polhemus, *Salda buenoi* (McDunnough), and *Salda lugubris* (Say), indicates a ridgelike condition for the transverse swelling, running from the margin of the antenniferous tubercle to the midline of the face, forming what would certainly be referred to as a postclypeus in the parlance of Cobben. Examination of *Lampracanthia crassicornis* (Uhler) and *Salda anthracina* Uhler, also belonging to the Saldini, shows the transverse swelling to be indistinguishable from the surrounding face, not extending across the posterior margin of the clypeus, and with no apparent impression along the facial midline adjacent to the posterior margin of the clypeus.

Thus, the clear-cut distinctions that Cobben (1959, 1960) made between the Chiloxanthinae and the Saldinae with regard to the ''postclypeus'' do not characterize accurately the nature of the morphology found in the Saldidae, as documented by our SEM and light microscopic observations. We would further observe that even though the transverse swelling differs in color from the remainder of the face in at least some Chiloxanthinae, in a way similar to what we see in the most Saldoidini, the swelling of this area is not strongly pronounced and shows little or no differentiation in texture from the surrounding cuticle, as is also the case in the Saldunculini and some members of the Saldini.

Characters 24–27: The function of the parandria in the Saldidae was discussed by Cobben (1957). It appears that soon thereafter Cobben also used these structures as taxonomic characters (Cobben, 1960). Lindskog and Polhemus (1992) presented the most detailed structural analysis to date, but their observations were limited to taxa placed in the genus *Saldula*. We have examined variation in the parandria over the range of *Pseudosaldula* spp. (pl. 6; figs. 17D, 19D) and compared that variation with what is seen in the five outgroup taxa (pl. 6; figs. 22D, 24E) included in our phylogenetic analysis. Our observations are presented in the form of line drawings (pl. 6) and scanning electron micrographs (figs. 17D, 19D, 22D, 24D).

Characters 28–33: Our examinations indicate that the form of the parameres in *Pseudosaldula* shares similarities with *Saldula* sensu Lindskog and Polhemus (1992) as well as with most—but not all—other members of the Saldoidini. We refer to the fact that the ventral face of paramere is conspicuously indented just basad of processus sensualis and forms a distinct line of demarcation on the face of paramere (character 28; figs. 2, 3, 9G, H); furthermore, the ovoid area distad of the line is smooth and devoid of setae (character 29; fig. 9G, H). This indentation on the ventral surface of the paramere can be readily seen in the paramere illustrations provided by Polhemus (1985). This structural type is in contrast with the condition found in the Chiloxanthinae and some members of the Saldinae (fig. 23), wherein the paramere face shows no line of demarcation and the texture of the cuticle is undifferentiated as well, as for example in *S. laelaps* and *S. stoneri*.

Characters 30 and 32: The processus sensualis (and the parameres more generally) in the Saldidae was apparently first illustrated in the taxonomic literature by Drake and Hottes (1949). It has been shown through the

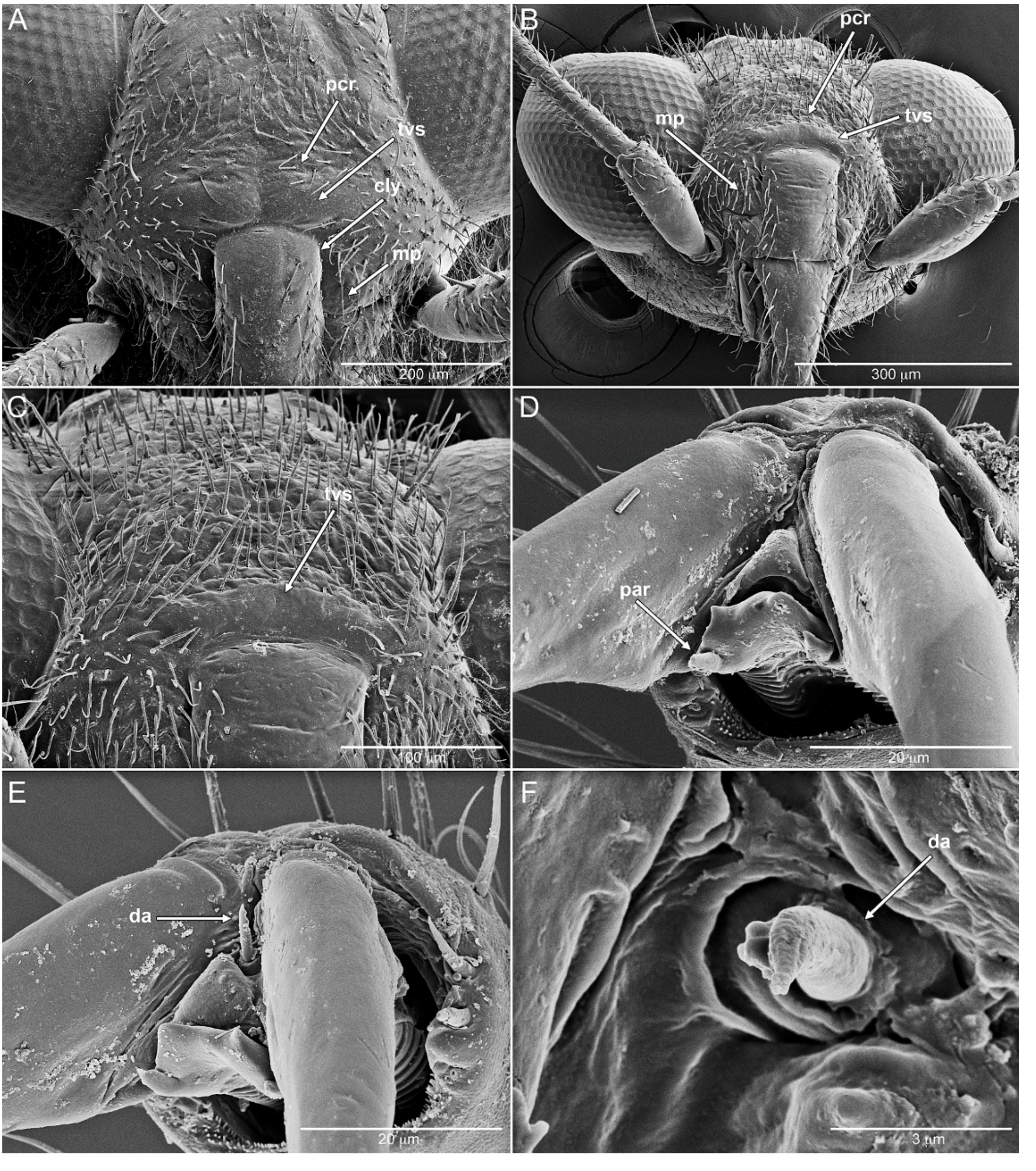


Fig. 21. Morphology of Chiloxanthinae (scanning electron micrographs). **A.** Frontal view of face of *Pentacora sphacelata*. **B.** Frontal view of head of *Paralosalda innova*. **C.** Detail of postclypeal region in *Paralosalda innova*. **D.** Foreleg pretarsus of *Paralosalda innova*, showing reduced parempodia and absence of dorsal arolium. **E.** Hind leg pretarsus of *Paralosalda innova* showing dorsal arolium. **F.** Detail of dorsal arolium on hind leg in *Paralosalda innova*. **cly,** clypeus; **da,** dorsal arolium; **mp,** mandibular plate; **par,** parempodia; **pcr,** postclypeal region; **tvs,** transverse swelling.

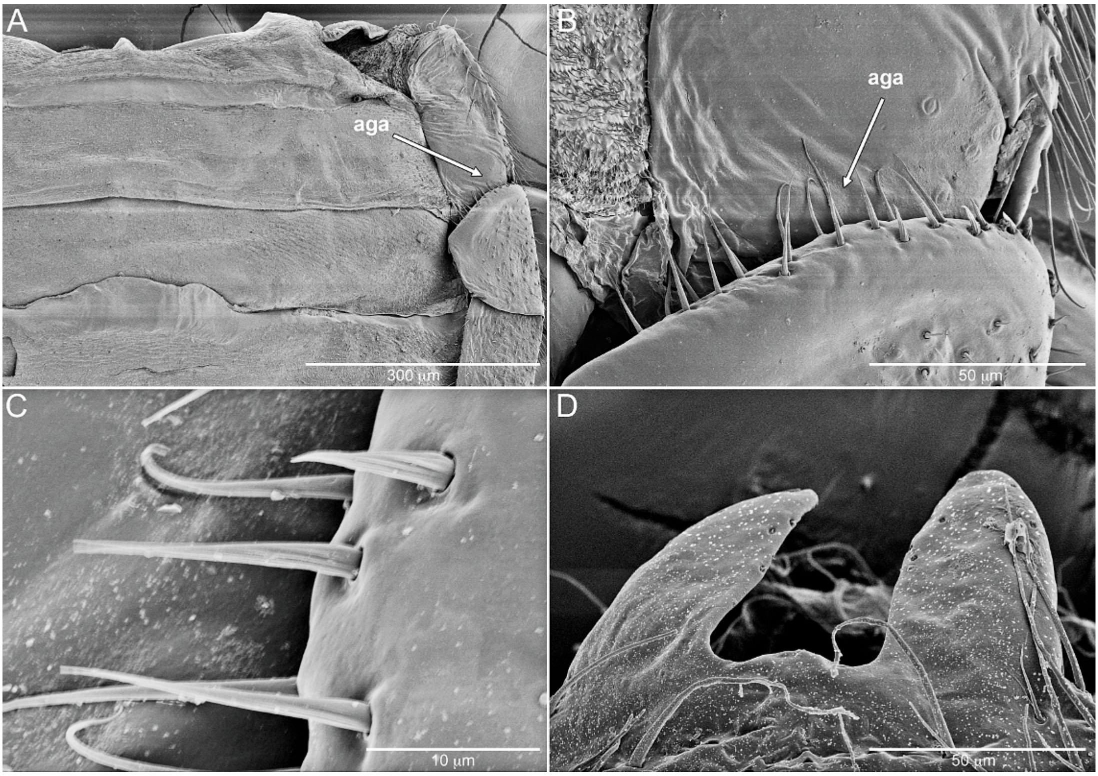


Fig. 22. *Paralosalda innova*. Male abdominal morphology (scanning electron micrographs). **A.** Dorsal view of anterior region of abdomen. **B.** Detail of right laterotergite 2 showing setae of abdominal grasping organ. **C.** Detail of setae of abdominal grasping organ. **D.** Dorsolateral view of parandria showing absence of medial membranous region. **aga,** abdominal grasping apparatus.

use of line drawings in many subsequent works, as, for example, the comprehensive treatment of Polhemus (1985), and through the use of photographs in the work of Lindskog and Polhemus (1992). Nonetheless, the processus sensualis and the remainder of the paramere have not been examined in such a way as to accurately discern the nature of many of their details. We therefore undertook a scanning electron microscopic examination of *Pseudosaldula* and outgroup species—as well as using incident and transmitted light microscopy—in order to derive a more critical understanding of the detailed structure of the paramere. Our findings are reflected in the codings of characters 30–32 (e.g., figs. 2, 3, 6, 8, 25).

Characters 33–36: Nymphal characters are coded for fourth- and fifth-instar specimens for which we were able to make confident associations with adults.

Molecular Character Data

Total genomic DNA was extracted using QIAGEN products (QIAGEN, 2006). The large mitochondrial ribosomal subunit (16S rRNA) and the Histone 3 (H3) were amplified using the Illustra PuRe Taq Ready to go PCR Beads and the primer pairs: 16S F CGC CTG TTT ATC AAA AAC AT and 16S R CTC CGG TTT GAA CTC AGA TCA; and H3a F ATGGCTCGTACCAAGCAGACVGC and H3a R ATATCCTTRGGCATRATRGTGAC; H3hF F CTCGTACCAAGCAGACMGC and H3h R CCTTGGGCATGATTGTTAC; and H3b F and H3b R are from Colgan et al. (1998). The annealing temperature of the PCR conditions was 48° C. The PCR purification and cycle-sequencing were carried out with a Biomek NX Laboratory Automation Workstation and using the Gencourt® AMPure® and CleanSEQ® sys-

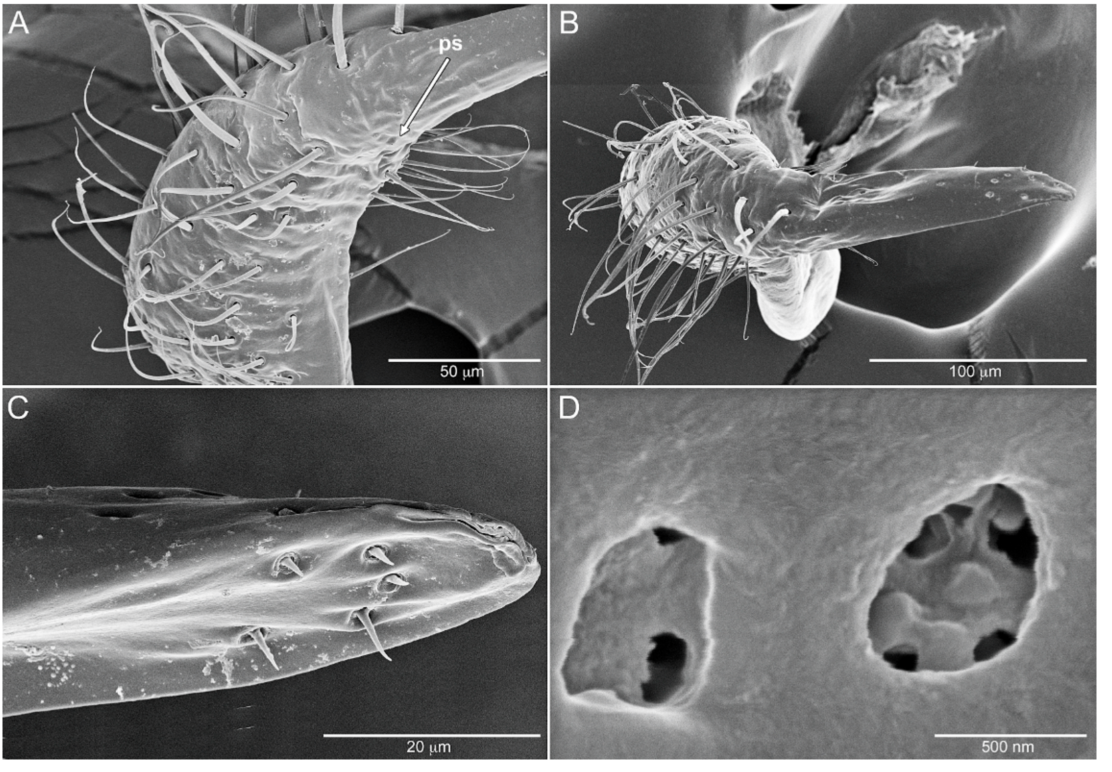


Fig. 23. *Saldula stoneri* (scanning electron micrographs): **A.** Apicoventral view of left paramere showing setae on processus sensualis. **B.** Apical view of left paramere. **C.** Apex of paramere showing short setiform sensors. **D.** Detail view of gland pore on paramere. **ps,** processus sensualis.

tems. The reactions were sequenced using an automated Applied Biosystem 3730 DNA analyzer and the sequences were edited with Sequencher 4.8 (Gene Codes Corporation). The unaligned sequences of 16S are 415–522 bp long and those for H3 are 314–321 bp long. GenBank accession numbers are given in table 4. We were unable to amplify either 16S or H3 for *Pseudosaldula aurea*.

Selection of Outgroup Taxa and Rooting of Cladograms

Our cladograms are rooted with *Paralosalda innova* Polhemus and Evans, a member of the Chiloxanthinae, unusual in that group primarily for its possession of only four cells in the membrane of the forewing. As additional outgroups we include two species of *Saldula* from the New World, *S. coxalis* and *S. ablusa*, as well as two nominal members of *Saldula* from New Zealand, *S. laelaps* and *S. stoneri*. The former pair of taxa was chosen for the similarity of structure in the parandria and parameres to what is seen in *Pseudosaldula* and the widespread occurrence of *S. coxalis* in the Andean region. The latter pair of species was included because we viewed their occurrence in New Zealand as a way of testing whether *Pseudosaldula* might be part of a more widespread austral lineage and because of their similarity of appearance to many species of *Pseudosaldula*, including the presence of conspicuous pruinose spots on the hemelytra.

Phylogenetic Methods

Morphological data were analyzed with the parsimony program NONA (Goloboff, 1998) using the mult* (with 20 iterations) and max* branch-swapping commands; the hold command was set to allow for a maximum of

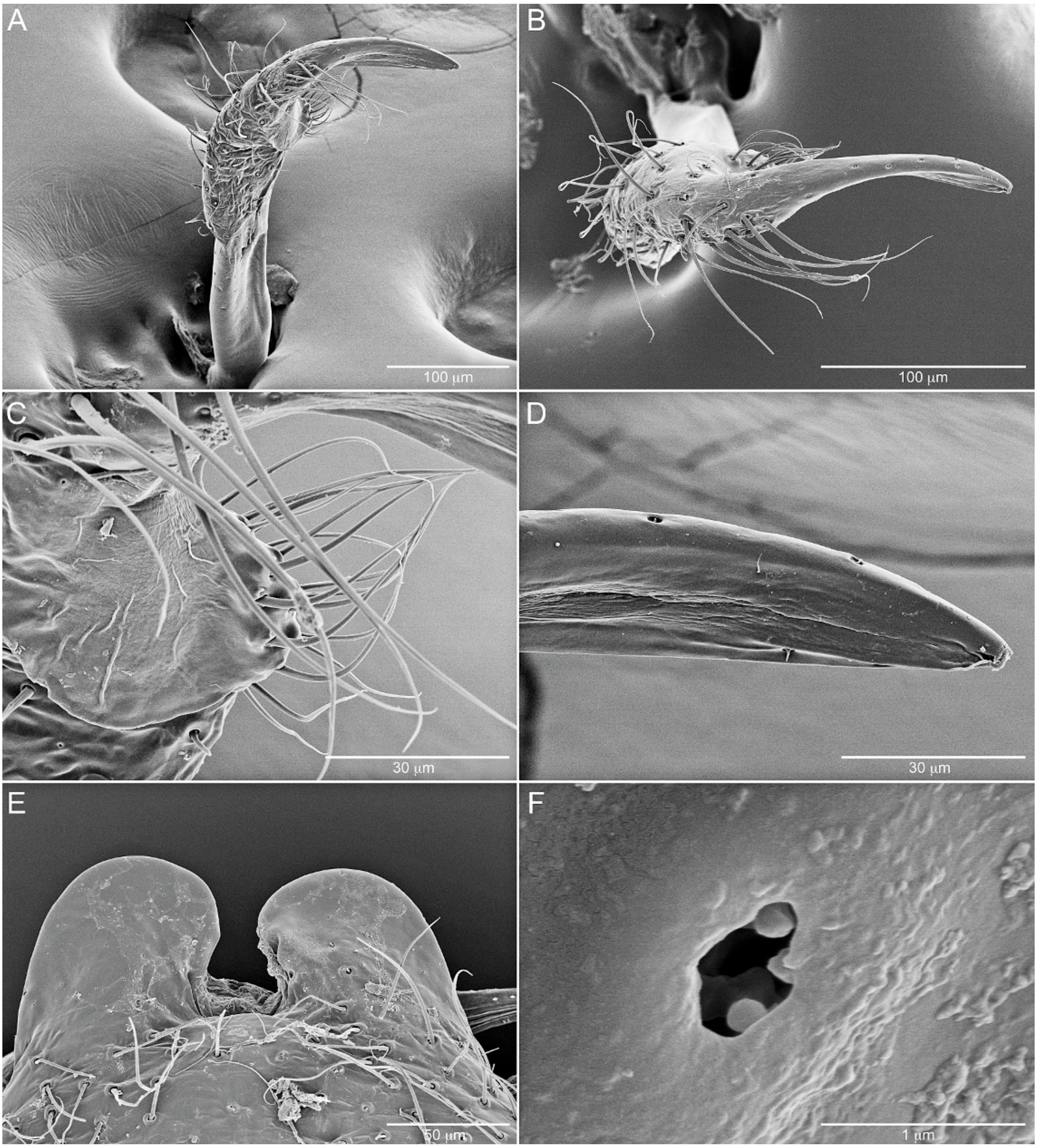


Fig. 24. *Saldula ablusa* (scanning electron micrographs). **A.** Frontoventral view of left paramere. **B.** Apical view of left paramere. **C.** Detail of processus sensualis showing insertion of setae on moundlike area. **D.** Apex of paramere showing short setiform sensors. **E.** Dorsal view of parandria. **F.** Detail of gland pore on paramere.

10,000 trees in memory. Data were further analyzed under the implied weights parsimony criterion with PIWE (Goloboff, 1993, 1997)—which produces best-fit trees by maximizing the sum of the average unit consistency index—using the same set of commands applied in NONA, with a concavity setting of 3.

The analysis of molecular data was undertaken using a total evidence approach in which both the 16S and H3 gene regions were combined for a simultaneous analysis and in

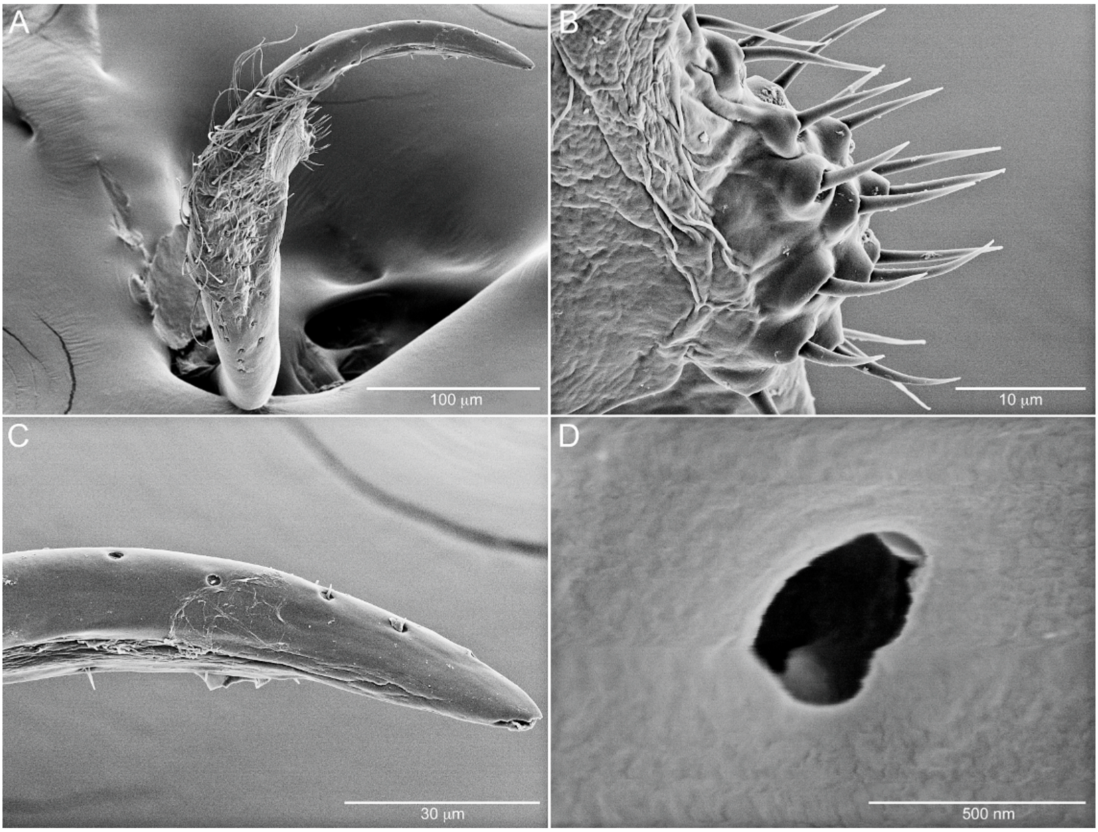


Fig. 25. *Saldula coxalis* (scanning electron micrographs). **A.** Frontoventral view of left paramere. **B.** Detail of processus sensualis showing insertion of setae on tubercles situated on moundlike area. **C.** Apex of paramere showing short setiform sensors. **D.** Detail of gland pore on paramere.

which the molecular data were also analyzed in conjunction with the morphological data. We applied the parsimony criterion using direct optimization (Wheeler, 1996) as implemented in the program POY 4.1.1 (Varón et al. 2008), to calculate dynamic homologies. The search strategy used in POY is as follows, in sequential order: 500 random addition sequences, SPR+TBR keeping one tree per search, select all. All characters were equally weighted, with gap opening 0. To assess nodal support, jackknife values were calculated in POY using 1000 replicates, 1 random taxa entry, SPR+TBR, and saving 10 trees per replicate.

PHYLOGENETIC RESULTS

The use of NONA with the commands described above found two trees with a length of 121 steps, a consistency index of 56, and a retention index of 67. The strict consensus of the two trees is shown in figure 26 with unambiguous optimizations of character data, as provided by the program WinClada (Nixon, 2000).

Analysis under implied weights with PIWE (Goloboff, 1993, 1997) recovered the single tree shown in figure 27. This tree has a fit of 248.6, a CI of 55, and a RI of 66. When the original unweighted data are fitted to the tree the length is 122 steps.

Although the topologies of the trees derived from these two analyses of morphological data differ in significant ways, they differ in length by only a single step. The two trees recognize in common nodes 1–6, although not all of them on the basis of the identical character information. The monophyly of *Pseudosaldula* is corroborated by the

TABLE 4
Accession numbers for DNA Sequencing

Taxon	AMNH unique specimen identifier	16S GenBank	H3 GenBank
Paralosalda innova	AMNH_ENT 00024163	GQ152492	NA
Pseudosaldula andensis	AMNH_ENT 00023956	GQ152493	NA
Pseudosaldula antioquia	AMNH_ENT 00024012	GQ152494	GQ152509
Pseudosaldula bergi	AMNH_ENT 00023940	GQ152495	GQ152510
Pseudosaldula bruesi	AMNH_ENT 00022607	GQ152496	NA
Pseudosaldula chilensis	AMNH_ENT 00023909	GQ152497	GQ152511
Pseudosaldula huamachuco	AMNH_ENT 00022939	NA	GQ152512
Pseudosaldula huamachuco	AMNH_ENT 00022948	GQ152498	NA
Pseudosaldula penai	AMNH_ENT 00023964	GQ152499	GQ152513
Pseudosaldula perula	AMNH_ENT 00023993	GQ152500	NA
Pseudosaldula pilosa	AMNH_ENT 00022874	GQ152501	NA
Pseudosaldula pilosa	AMNH_ENT 00023982	NA	GQ152514
Pseudosaldula salina	AMNH_ENT 00023418	GQ152502	NA
Pseudosaldula saxicola	AMNH_ENT 00023949	GQ152503	NA
Pseudosaldula vulgaris	AMNH_ENT 00020202	GQ152504	NA
Pseudosaldula vulgaris	AMNH_ENT 00023973	NA	GQ152515
Pseudosaldula yungas	AMNH_ENT 00024000	GQ152505	NA
Salda sp.	AMNH_ENT 00024088	EU683107	GQ152516
Saldula coxalis	AMNH_ENT 00024162	GQ152507	NA
Saldula ablusa	AMNH_ENT 00024161	GQ152506	GQ152517
Saldula stoneri	AMNH_ENT 00024164	GQ152508	NA

presence of five cells in the membrane (6-1), the transverse swelling not extending across the posterior margin of the clypeus and the postclypeal region of similar texture to the surrounding face (17-2), and the nearly straight, moderately elongate posterior margin of the parandria (27-2). The last condition is not evident in all of our drawings of *Pseudosaldula* as we have rendered them in figure 1, but nonetheless seems relatively clearcut when comparisons are made with *Saldula* species as characterized by Lindskog and Polhemus (1992). The PIWE analysis (fig. 27) further treats the condition of the 10–15 setae in a linear proximal grouping on the processus sensualis (31-2) as synapomorphic for *Pseudosaldula*. In both analyses, *P. salina* is treated as the sister group of the remaining *Pseudosaldula* spp., the latter group being recognized on the basis of characters that all show homoplasy in both analyses.

The remaining groups shared in common between the NONA and PIWE analyses are the following:

saxicola group (fig. 26, node 9; fig. 27, node 15) – diagnosed by several characters, including the form of the pronotum. The habit of all of species in this group to live on wet rock surfaces, sometimes in rapidly flowing streams, is also distinctive within the genus;

andensis group (fig. 26, node 15; fig. 27, node 11) – diagnosed by the extensive polishing of both the exocorium and the radial vein;

vulgaris group (fig. 26, node 12; fig. 27, node 14) – diagnosed by the conspicuous pruinose areas and the blunt, weakly broad apex of the parandria.

The primary differences between the two trees are:

(1) *P. chilensis* and *P. penai* are treated as sister groups in the PIWE analysis (fig. 27, node 7) whereas *P. penai* is the sister group to the remaining species of *Pseudosaldula* in the NONA tree (fig. 26, nodes 6 and 7);

(2) *P. bergi* and *P. pilosa* are sister groups in the NONA analysis (fig. 26, node 14) whereas *P. bergi* is the sister group of *P. pilosa* plus the remaining species of *Pseudosaldula* in the PIWE tree (fig. 27, nodes 8 and 9);

(3) The *saxicola* group is treated as the sister group of *P. aurea* in the PIWE analysis, whereas it is treated as the sister group of all species excepting *P. salina*, *P. chilensis*, *and P. penai* in the NONA analysis (fig. 26, node 8),

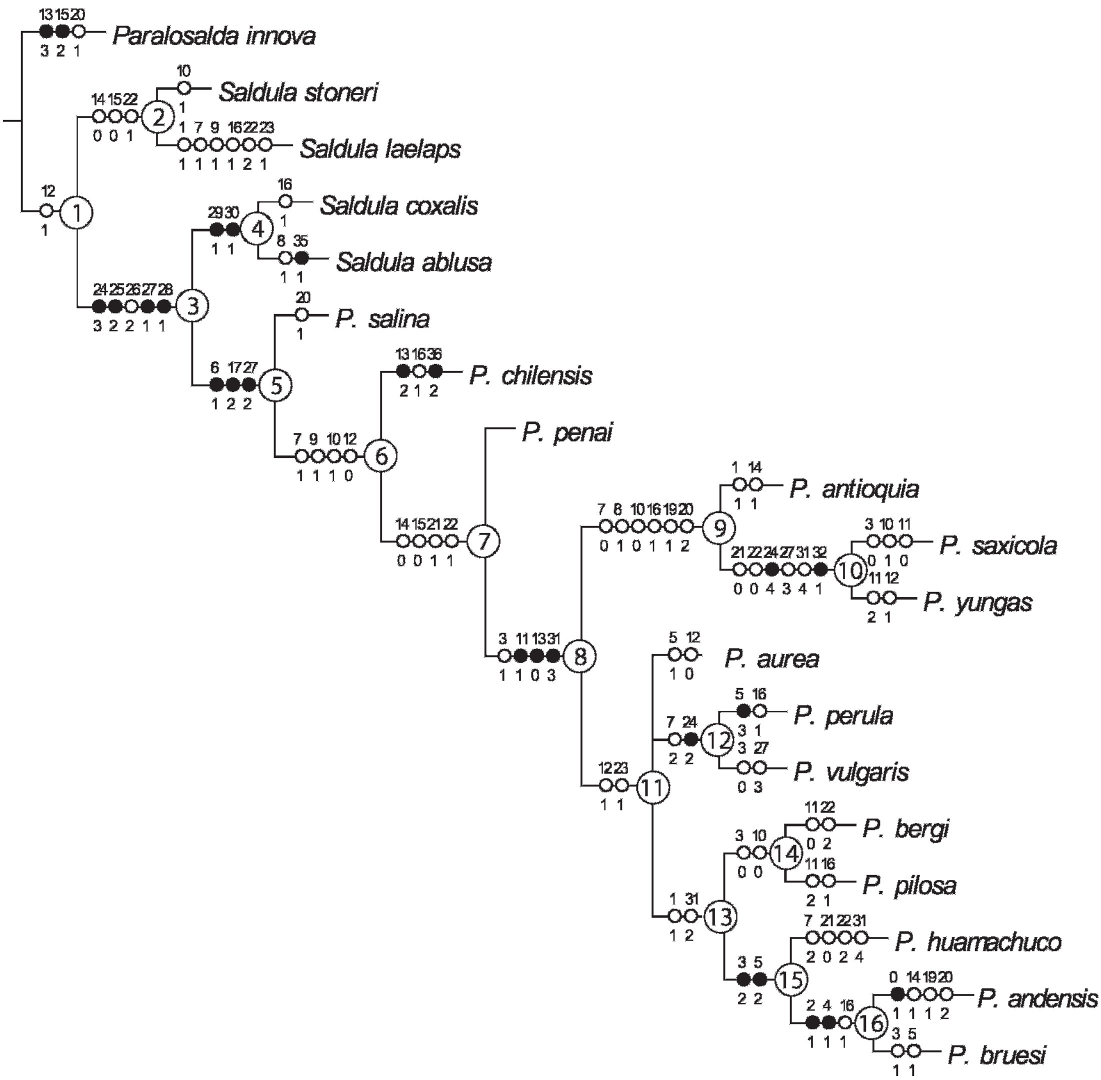


Fig. 26. Cladogram of relationships of *Pseudosaldula* spp. Strict consensus of two equally most parsimonious cladograms. Ambiguity of relationships exists in the placement of *P. aurea*.

with the position of *P. aurea* the single ambiguity in the NONA consensus tree (fig. 26, node 11).

Our simultaneous analysis of the combined molecular partitions recovered three trees with a length of 747 steps. Simultaneous analysis of the combined morphological and molecular partitions recovered three trees of 927 steps. The strict consensus of the trees from these two analyses is identical and is shown in figure 28; jackknife support values are shown at the nodes.

Whereas the results of analyses of the morphological data (figs. 26, 27) treat *Pseudosaldula* as a monophyletic group, the combined analysis of sequence data alone and of morphological and sequence data consistently treat *Pseudosaldula* as paraphyletic (fig. 28). On the one hand *P. andensis* and *P. perula* are treated as part of a group containing *Saldula ablusa*, *S. coxalis*, and *Salda* sp. The remaining *Pseudosaldula* spp. belong to a group that also includes the New Zealand endemic *Saldula stoneri*. As can be

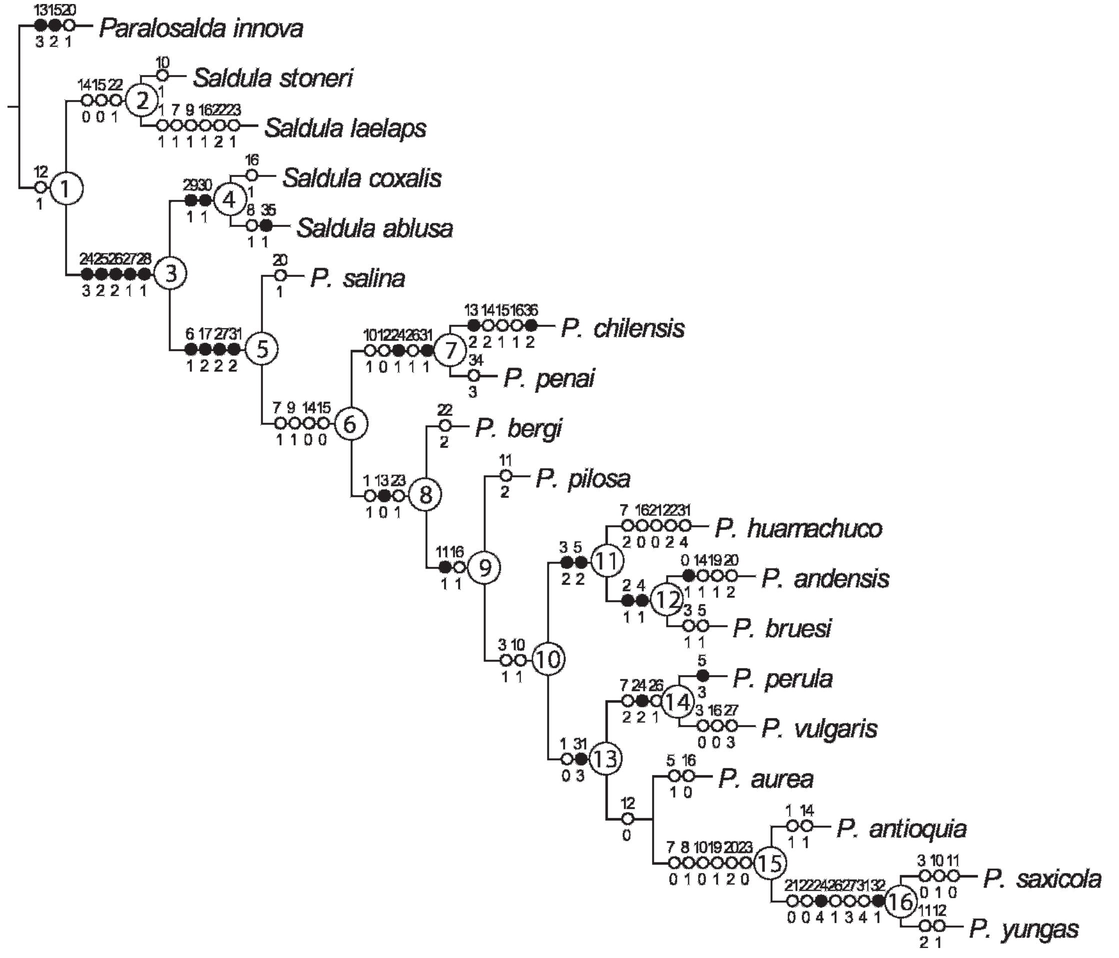


Fig. 27. Cladogram of relationships of *Pseudosaldula* spp. based on the use of implied weighting.

seen from our discussion of morphology, there are several morphological characters that argue for the monophyly of *Pseudosaldula*, but no evidence that would consistently argue for the recognition of the groupings found in the combined analysis. We interpret the results involving molecular data as being influenced by an inadequate and/or inappropriate sample of genomic data. Because *Pseudosaldula* becomes polyphyletic with a transpacific distribution, as opposed to being a monophyletic group with an Andean distribution, and because several morphological characters documenting the monophyly of *Pseudosaldula* not unexpectedly show greater homoplasy in the combined analysis than when analyzing morphological data alone, we have chosen to disregard the molecular result. It is our view that the 16S data, in particular, do not possess variation of a type adequate to resolve relationships within the Saldoidini, and by extension within the Saldidae more broadly. The effective application of molecular data will doubtless require sampling a broader cross section of the genome and of necessity include regions that show a slower rate of change, possibly including 18S rDNA and 28S rDNA. We chose to work with 16S and H3 because the former is particularly easy to amplify and because it had been shown to be useful for species-level analyses in other groups of Heteroptera. We did not have the time and financial resources, nor material

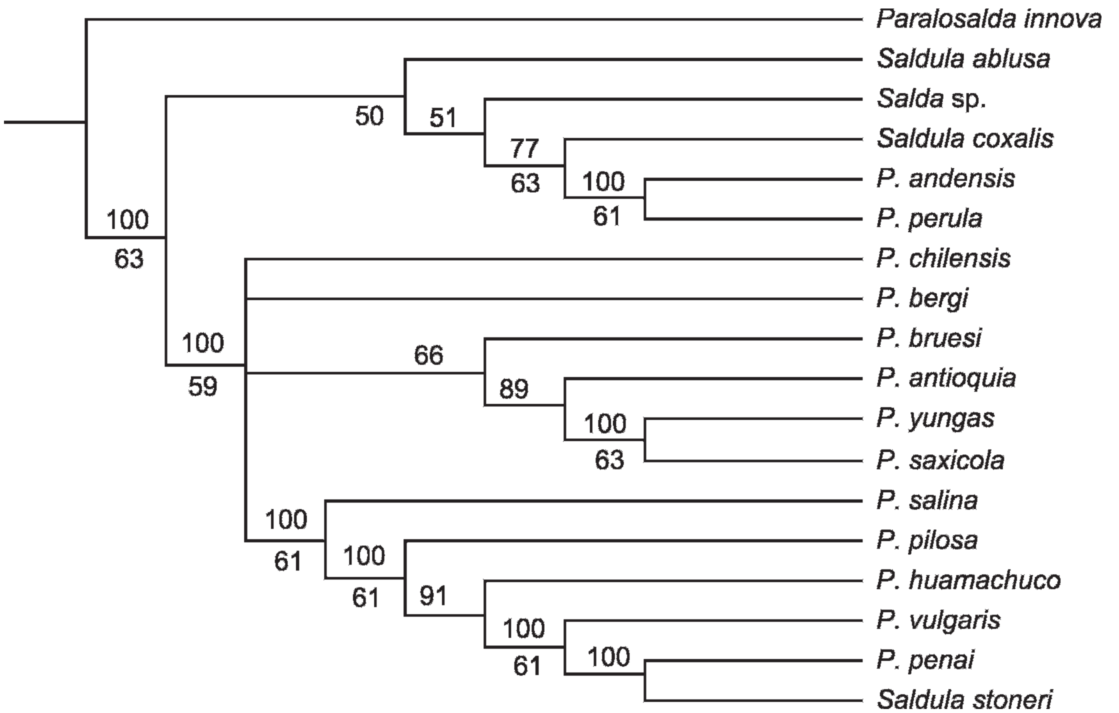


Fig. 28. Strict consensus of three cladograms derived from simultaneous analysis of the 16S rDNA and H3 gene regions and morphological data. Jackknife support values for morphology + DNA sequences are shown above the line, for DNA sequence data only below the line.

well enough preserved, to attempt the amplification of 18S and 28S, and did not anticipate that they would show the appropriate level of variation for this particular analysis.

Even though we do not accept the results of analyses involving molecular data as being an accurate representation of relationships within *Pseudosaldula*, we are convinced that the New Zealand fauna is in desparate need of further study. Genitalic morphology of *S. laelaps* and *S. stoneri* shares little in common with that seen in most of the remaining species placed in *Saldula* (see Lindskog and Polhemus, 1992), nor does the habitus of some of the remaining New Zealand species. We do not outright reject the concept of southern transpacific biogeographic connections in the Saldidae, but argue that credible documentation will require the inclusion of a broader range of taxa and a broader sample of molecular data shown to possess variation appropriate to addressing the problem. The deposition of our sequences in GenBank, nonetheless, offers a starting point for future work in the design of primers for 16S and H3 and for further comparative work on variation in these gene regions in the Saldidae.

ECOLOGICAL OBSERVATIONS

The distribution of *Pseudosaldula*, as portrayed in the present paper, is restricted almost exclusively to the Andes, and usually to higher altitudes and lower latitudes. There is a strong correlation between these variables, as we show in figure 29. The strongest outliers are represented by localities for *Pseudosaldula antioquia*, which occurs at relatively low latitudes and elevations. Without some standard of comparison, one might question whether the group is not more widely distributed and whether the Andean distribution is only the result of a geographically limited sampling regime. Short of offering a revision of the entire South American fauna, we want to assure the

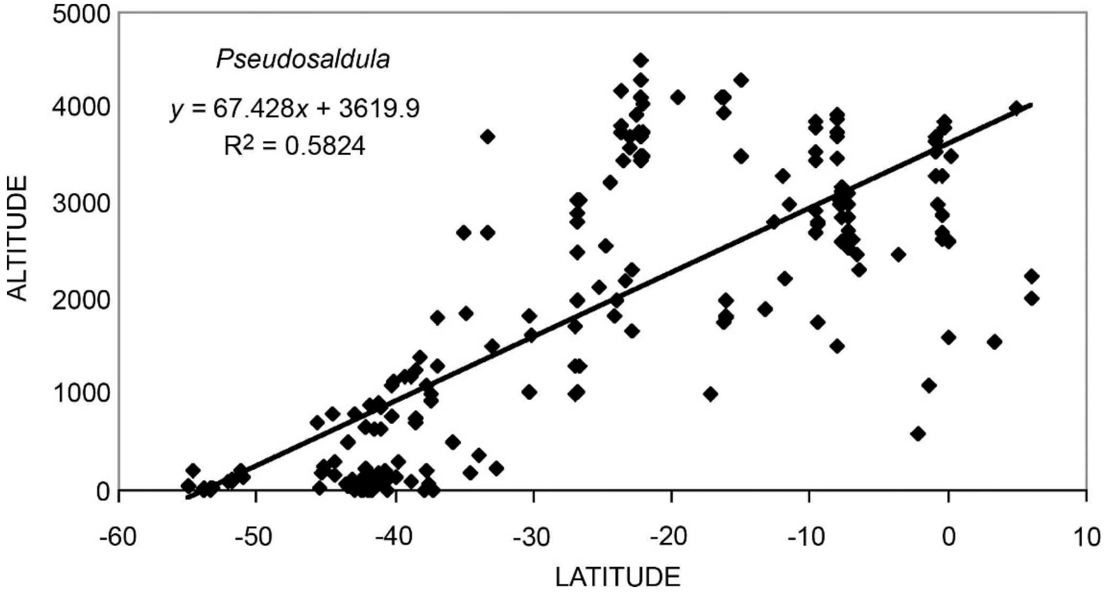


Fig. 29. Plot of altitude against latitude and regression line (R^2) showing strong correlation between altitude and latitude. Based on 256 localities.

reader that our sample of localities in South America—more than 250 for *Pseudosaldula* alone—extends from sea level to near the vegetation line over the broad range of latitudes on both slopes of the Andes. Specimens of Saldidae belonging to other genera were taken at many localities listed herein, as well as a large number of other localities. Many of those specimens taken at higher altitudes and on the Pacific slope belong to the genus *Saldula*, whereas few members of the Saldidae are encountered in the Amazon drainage. These data indicate—in our view—that the distribution of *Pseudosaldula* as described in the present paper is far from artifactual.

Under each species we have attempted to summarize available information on habitat associations within *Pseudosaldula*. Although such information is rather general in nature, we believe some conclusions may be drawn from the data. On the one hand, *Pseudosaldula chilensis* is the most widespread of all *Pseudosaldula* spp. and appears to occupy the most disturbed and temporary habitats. These include—among others—stream margins that are subject to episodic flooding (pl. 7C), an environment commonly occupied by *Saldula* spp., but one in which *Pseudosaldula* spp. are much less frequently encountered. Furthermore, *P. chilensis* is known only from macropterous (and possibly some submacropterous), flighted individuals, a characteristic frequently associated with life in temporary habitats. *Pseudosaldula salina* and the three rock-dwelling species in the *saxicola*-group are also known primarily from macropterous forms. In the case of *P. salina*, the species is known from only a single locality and it is therefore impossible to say whether the species is always macropterous, and if so, whether the condition is correlated with episodic habitat changes. The known habitats occupied by members of the *saxicola*-group are at least in part subject to change, because of desiccation during dry periods, as in the case of some rock faces, or because of severe flooding during torrential rains in the case of forest streams (pl. 8A, B).

All remaining species appear to live in more permanent habitats, including the marine littoral, as is the case for most known collections of *P. bergi* (pl. 7A, B), or the shores of permanent natural lakes (pl. 7E–H). One conspicuous aspect of many Andean environments between 2500 and 4500 meters—the Paramo and Puna—is large permanent seeps (pl. 8C, G), which are frequently inhabited by one or more *Pseudosaldula* spp., in the case of this locality near Tafi del Valle, Tucuman Province, Argentina, by *P. aurea* and *P. pilosa*. These seep environments are invariably in open country devoid of native trees, similar in appearance to Patagonian landscapes occupied by *Pseudosaldula* spp. in southern Argentina and Chile.

HISTORICAL BIOGEOGRAPHIC ANALYSIS

South America and tropical Central America were labeled as the Neotropical Region by Sclater (1858) and have often been thought of as a historical biogeographical unit with a unique history. This conception of biotic evolution has nonetheless been challenged over time on a number of fronts, most of which have sought to overturn the idea that South America itself represented a single unified area. The single-area thesis was defended by Darlington (1965), but was at the same time was seriously challenged by Brundin (1966) and others—who argued using the powerful tools of phylogenetic systematics (cladistics) and a pattern-based view of historical biogeographic analyses that much of Chile and part of southern Argentina were part of a broader Austral biotic region that also includes New Zealand and Australia in the Recent and previously also included part of Antarctica.

The single origin view of the South American fauna was also embodied in the view that faunal interchange between North and South America was facilitated by the emergence of the Panamanian Land Bridge in the Pleiocene—and implicitly—that all shared elements between the two continental areas were of Pleio–Pleistocene origin. Nondispersalist approaches to historical biogeographic analysis have tended to discount such views, as has the continued accumulation of contrary evidence concerning the influence of plate tectonics on earth history as well as the results of cladistic analyses in many groups of organisms.

Pseudosaldula, the subject of the present study, occupies the Andean Region, a distributional concept that dates back to at least 1927 and which was included as part of a recent review of biogeography in the Neotropics by Morrone (2001). Because groups of organisms occupying the Andean Region almost by definition occur in Chile, and like *Pseudosaldula* usually show at least moderate diversity there, the question can be asked as to whether this distributional pattern is part of a broader austral pattern, as has been documented for groups of Chironomidae by Brundin (1966) and for many other groups of plants and animals. Our phylogenetic analysis suggests that this is not the case for *Pseudosaldula*, and that there is no necessary reason to believe that its sister-group relationships are austral in nature. This conclusion seems to be supported by the evidence even though *Pseudosaldula* spp. and the New Zealand species that we examined in detail possess in common many superficially similarities, but they appear to share few if any group-forming morphological characters. We do not pretend to extend such a conclusion concerning transantarctic relationships to other groups, and its veracity with regard to the Saldidae could no doubt benefit from further study.

Empirical examples of Andean distributional patterns are found in many groups of plants and animals. Morrone (2001) listed a large number of such groups that have been well documented taxonomically. Among these, we will mention the genus *Gigantodax* Enderlein (Diptera: Simuliidae) (see Wygodzinsky and Coscarón, 1989, which has several species groups that have distributions closely resembling the distribution of *Pseudosaldula*). Furthermore, the Andean Region has been the subject of recent papers that have sought to test theories concerning areas of endemism and to use up-to-date methodological approaches for understanding the interrelationships of those areas. Among these are the work of Donato et al. (2003), which employed DIVA (Ronquist, 1997) as a way of interrelating areas of endemism within the subtribe Listroderina (Coleoptera: Curculionidae) and that of Lizarralde and Szumik (2007), which employed algorithmic methods for the recognition of areas of endemism (Szumik et al., 2002; Szumik and Goloboff, 2004) as a way to better understand areas of endemism within the genus *Pelinoides* Cresson (Diptera: Ephedridae). These papers offer a background for better understanding the nature of endemism within the genus *Pseudosaldula* as well as the interrelationships of those areas.

Geographic sampling in Pseudosaldula: Our knowledge of the detailed distribution of several *Pseudosaldula* species is still limited even though we now have in excess of 3500 specimens available from more than 250 georeferenced localities. This incomplete understanding is the result of at least two factors. First, some species, such as *P. aurea*, *P. huamachuco*, and *P. salina* are known from only one or two localities, and therefore have essentially point distributions. *Pseudosaldula aurea* and *P. huamachuco* do not appear to occupy habitats distinct from those occupied by many of the other *Pseudosaldula* spp., and particularly in the case of *P. huamachuco*, the geographic region of its occurrence has been reasonably well sampled; nonetheless, *P. huamachuco* remains known from a single collecting event.

Second, many parts of the Andes are difficult of access and therefore have not been the subject of sufficient collecting effort, or remain unsampled simply by virtue of the vast size of the area. Examples of the former situation include the Peruvian Andes from Huancayo south to about Cuzco and the Andean plateau of northern Chile and Argentina. The latter circumstance is possibly best exemplified by southern Ecuador, which has a network of roads, but remains almost unsampled because no specialist collector has ever worked there. These very extensive areas remain virtually devoid of information in our analyses.

With these realities in mind, we have confidence that some aspects of our distributional knowledge are reasonably secure, as for example the very limited diversity of *Pseudosaldula* in northern Ecuador (*P. andensis*, *P. antioquia*) and the overall distributions of *P. bergi* and *P. chilensis*, whereas the details of the distribution of several species (*P. saxicola*, *P. yungas*, *P. vulgaris*, and *P. aurea*) could still benefit from additional field work.

Areas of endemism in Pseudosaldula: Donato et al. (2003) treated distributions in the Andean Region in a very coarse manner, recognizing four subregions, on what might be described as a qualitative basis. The methods proposed by Szumik et al. (2002) and Szumik and Goloboff (2004) offer promise for determining areas of endemism on a more strongly analytic basis. Nonetheless, the Szumik/Goloboff approach requires that distributional patterns be repeated across groups in order to achieve a corroborated result. The use of these methods with *Pseudosaldula* would therefore require that additional taxa be georeferenced and added to the overall analysis. *Pelidnoides* offers potential in this regard, but many of the species in that group show much narrower distributional ranges within Chile than do *Pseudosaldula* spp., a feature that limits the use of *Pseudosaldula* in making biogeographic comparisons. We have therefore chosen to adopt a qualitative approach to the recognition of areas of endemism at this time.

Even allowing for several widespread distributions within *Pseudosaldula*, the available data nonetheless suggest that at least five areas of endemism can be recognized within the genus and that these areas show a strong correspondence with the areas postulated by Donato et al. (2003). The areas we recognize are identified on map 15 and can be summarized as follows with a listing of the species that inhabit them:

Northern Andes	*antioquia* [*andensis*]
Northern Peru	[*andensis*], *bruesi*, *huamachuco* [*perula*], *vulgaris*
Puna	*aurea*, *penai*, [*perula*], [*pilosa*], *saxicola*, *salina*, *yungas*
Central Chile	[*chilensis*], [*pilosa*]
Subantarctic	*bergi* [*chilensis*]

Species listed inside square brackets have widespread distributions relative to the other 10 species and cannot be treated as precinctive to one of the above-listed provinces simply on the basis of inspection. Furthermore, all of the areas as defined have a few outlying distributional points. The existence of Central Chile as an area of endemism is a conclusion drawn from its recognition in taxa other than *Pseudosaldula* (Donato et al., 2003; Lizarralde and Szumik, 2007), rather than the fact that one or more of the *Pseudosaldula* spp. is restricted to that area; nonetheless, *P. chilensis* and *P. pilosa* both have distributions that include Central Chile,

Map 15. Combined distributions of *Pseudosaldula* spp. and putative areas of endemism.

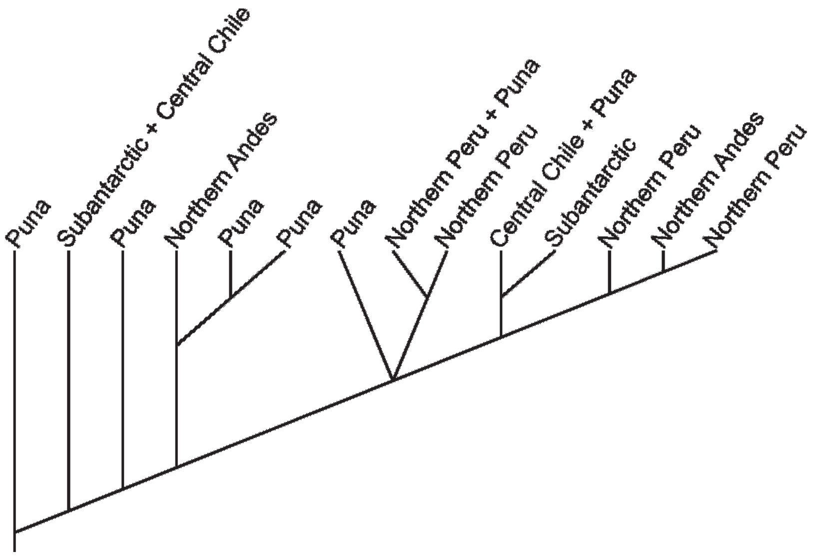


Fig. 30. Area cladogram for consensus most parsimonious tree for *Pseudosaldula*.

and the distributions of both of these species overlap with those of other taxa that do not occur in Central Chile.

We have not included argentine Patagonia as a subregion, in the sense that it was recognized as an area of endemism by Morrone (2001), Donato et al. (2003), and Lizarralde and Szumik (2007). Even though there are limited records from the Andean foothills in Argentina and from steppelike environments in the far south, there is no evidence that *Pseudosaldula* occurs more widely in Patagonia.

Relating areas of endemism: Allowing that the cladograms in figures 26 and 27 might both be considered plausible scenarios for the interrelationships of the known *Pseudosaldula* spp., we have converted them into *area cladograms* (Rosen, 1975; see also Schuh, 2000), which are shown in figures 30 and 31.

The most parsimonious tree, as produced via NONA (fig. 30), produces the less clear-cut biogeographic picture because at all levels it commingles northern and southern aspects of the distributions. The implied weights tree, as produced by PIWE (fig. 31), on the other hand shows repetition of occurrence of the northern parts of the distribution in the more distal parts of the cladogram and the southern areas appear only basally on the cladogram. Thus, if we allow that the occurrence of Puna (in the form of *P. salina*) near the base of the cladogram can be allowed to float to a more distal position because it also occurs there, figure 31 would seem to allow for the following theory:

1. Subantarctic is the basal area on the cladogram;
2. Central Chile is the next area on the cladogram and either *penai* and/or *pilosa* are endemic to it;
3. Puna is the next area on the cladogram;
4. Northern Peru and Northern Andes area terminal sister areas on the cladogram.

Alternatively, one might conclude that what we have identified as Puna is actually a composite, which under more precise characterization might allow for a scenario that does not relate it directly to virtually every other recognized area of endemism.

Areas of endemism within *Pseudosaldula* in Chile are much larger than those of spiders, as seen by Platnick (1991) and some other taxa as recognized by Morrone (2001), Donato et al. (2003), and Lizarralde and Szumik (2007). Nonetheless, the areas of endemism we have recognized within the group are in broad concordance with those recognized in other groups. Furthermore, the fact that the basal areas of endemism on the area cladograms are the geograph-

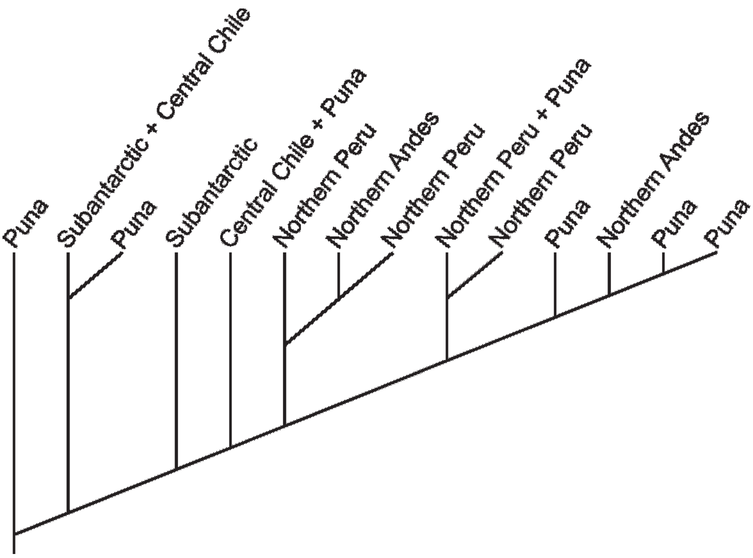


Fig. 31. Area cladogram for implied weights tree for *Pseudosaldula*.

ically most southerly is congruent with the cold-adapted nature of most species of the taxon, with *P. antioquia* the notable exception. Even though Donato et al. (2003) and Lizarralde and Szumik (2007) have produced detailed biogeograpic scenarios for listroderine Curculionidae and ephydrid flies, respectively, for two reasons their results are not easy to compare with our observations on *Pseudosaldula*. First, their results are not presented in such a way as to indicate direct relationships between the areas of endemism. Second, although the overall outlines of the areas identified by Donato et al. are very similar to those that we recognize, the distributions of the individual species are generally narrower than those found in *Pseudosaldula*, especially within Chile, and the therefore are not straightforwardly compared.

Further collecting, especially in southern Peru, Bolivia, and the Andean massif in northern Argentina and Chile may help to more accurately clarify the true diversity of *Pseudosaldula* in that area and provide greater precision concerning the distributions of some of the species. We particularly recommend searching for members of the *saxicola* species group, whose taxonomy we would predict may be more complex than has been portrayed in the present paper. Furthermore, the single locality known for *P. salina* begs for further searching of the great saline lake area of the high Andes in Bolivia, northern Argentina, and northern Chile. Finally, the use of additional detailed morphological data, as well as DNA sequences, might also help to shed light on the accuracy of our phylogenetic analysis.

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REFERENCES

Bahr, A., and G. Schulte. 1976. Die Verbreitung der Uferwanzen (Heteroptera: Saldidae) im brackigen und marinen Litoral der nordamerikanischen Pazifikküste. Marine Biology 36: 37–45.

Blanchard, E. 1852. [Description of *Acanthia chilensis*]. *In* C. Gay (editor), Historia fisica y politica de Chile. Zoologia 7: 113–320. Paris.

Brown, E.S. 1959. *Salduncula*, an intertidal saldid in Madagascar. Naturaliste Malgache 11(1–2): 73–76.

Brundin, L. 1966. Transantarctic relationships and their significance, as evidenced by chironomid midges. Kungliga Svenska Vetenskapsakademiens Handlingar. Fjarde Series 11: 1–472.

Catalá, S., and C. Schofield. 1994. Antennal sensilla of *Rhodnius*. Journal of Morphology 219: 193–203.

China, W.E. 1962. Hemiptera-Heteroptera collected by the Royal Society Expedition to South Chile 1958–1959. Annals and Magazine of Natural History (13) 5: 705–723, 7 figs.

Cobben, R.H. 1957. Beitrag zur Kenntnis der Uferwanzen (Hemiptera-Heteroptera Fam. Saldidae). Entomologische Berichten 17: 245–257.

Cobben, R.H. 1959. Notes on the classification of Saldidae with the description of a new species from Spain. Zoologische Mededelingen 36(22): 303–316.

Cobben, R.H. 1960. Die Uferwanzen Europas. Hemiptera-Heteroptera Saldidae. *In* W. Stichel (editor), Illustrierte Bestimmungstabellen der Wanzen II. Europa (Hemiptera Heteroptera Europae) 3: 209–263. Berlin: W. Stichel.

Cobben, R.H. 1961. A new genus and four new species of Saldidae (Heteroptera). Entomologische Berichten 21: 96–107.

Cobben, R.H. 1970. Morphology and taxonomy of intertidal dwarf bugs (Heteroptera: Omaniidae, n. fam.). Tijdschrift voor Entomologie 113: 61–90.

Colgan, D.J., A. McLauchlan, G.D.F. Wilson, S.P. Livingston, G.D. Edgecombe, J. Macaranas, G. Cassis, and M.R. Gray. 1998. Histone H3 and U2 snRNA DNA sequences and arthropod molecular evolution. Australian Journal of Zoology 46: 419–437.

Darlington, P.J. 1965. Biogeography of the southern end of the world: distribution and history of far-southern life and land, with an assessment of continental drift. New York: McGraw-Hill, 236 pp.

Distant, W.L. 1891. Rhynchota. *In* E. Whymper (editor), Supplementary appendix to travels amongst the Great Andes of the Equator, 111–120. London: Murray, 147 pp.

Distant, W.L. 1893. Descriptions of new genera and species of neotropical Rhynchota. Transactions of the Entomological Society of London 1893: 83–96.

Donato, M., P. Posadas, D.R. Miranda-Esquivel, E.O. Jaureguizar, and G. Cladera. 2003. Historical biogeography of the Andean region: evidence from Listroderina (Coleoptera: Curculionidae: Rhytirrhini) in the context of the South American geobiotic scenario. Biological Journal of the Linnaean Society 80: 339–352.

Drake, C.J. 1949. Some American Saldidae (Hemiptera). Psyche 56(4): 187–193.

Drake, C.J. 1955. New South American Saldidae (Hemiptera). Journal of the Kansas Entomological Society 28(4): 152–158.

Drake, C.J. 1962. Synonymic data and two new genera of shore bugs (Hemiptera: Saldidae). Proceedings of the Biological Society of Washington 75: 115–124.

Drake, C.J., and J.C.M. Carvalho. 1948. Concerning South American Saldidae (Hemiptera). Revista de Entomologia (Rio de Janeiro) 19(3): 473–479.

Drake, C.J., and L. Hoberlandt. 1951. Catalogue of genera and species of Saldidae (Hemiptera). Acta Entomologica Musei Nationalis Pragae 26(376): 1–12. (1950).

Drake, C.J., and F.C. Hottes. 1949. Two new species of Saldidae (Hemiptera) from western United States. Proceedings of the Biological Society of Washington 62: 177–184.

Goloboff, P.A. 1993. Estimating character weights during tree search. Cladistics 9: 83–91.

Goloboff, P.A. 1997. PIWE, version 2.6. Parsimony and implied weights. Program and documentation.

Goloboff, P.A. 1998. NONA, version 2.0. Program and documentation. New York: American Museum of Natural History.

Haglund, C.J.E. 1899. Die Hemipteren der Schwedischen Expedition nach den Magellanslandern 1895–1897. Svenska Expedition till Magellanslanderna 2(9): 173–178.

King, P.E., and N.A. Ratcliffe. 1970. The surface structure of the cuticle of the intertidal hemipteran, *Aepophilus bonnairei* Sign. Entomologists Monthly Magazine 106: 1–2.

Kirkaldy, G.W. 1899. Sur quelques Hémiptères aquatiques nouveaux ou peu connus. Revue d'Entomologie 18: 85–96.

Lethierry, L., and G. Severin. 1896. Catalogue général des Hemiptères. Vol. III. Hétéroptères. Berlin: R. Friedlander, 275 pp.

Lindskog, P., and J.T. Polhemus. 1992. Taxonomy of *Saldula*: revised genus and species group definitions, and a new species of the *pallipes* group from Tunisia (Heteroptera: Saldidae). Entomologica Scandinavica 23: 63–88.

Lizarralde, M., and C. Szumik. 2007. Phylogeny and biogeography of the genus *Pelinoides* Cresson (Diptera-Ephydridae). Zootaxa 1510: 35–50.

Morrone, J.J. 2001. Biogeografía de América Latina y el Caribe. M&T–Manuales y Tesis SEA. Vol. 3. Zaragoza, Spain: Sociedad Entomológica Aragonesa, 148 pp.

Nixon, K.C. 2000. WinClada, version 0.9.99.60 (program). Ithaca, NY: Published by the author.

Parsons, M.C. 1962. Skeleton and musculature of the head of *Saldula pallipes* (F.) (Heteroptera: Saldidae). Transactions of the Royal Entomological Society of London 114: 97–130.

Platnick, N.I. 1991. On areas of endemism. Australian Systematic Botany 4: xi–xii.

Polhemus, J.T. 1976. Shore bugs (Hemiptera: Saldidae, etc.). *In* L. Cheng (editor), Marine insects, 225–262. Amsterdam: North-Holland Publishing Company.

Polhemus, J.T. 1985. Shore bugs (Heteroptera, Hemiptera; Saldidae): a world overview and taxonomy of Middle American forms. Englewood, CO: Different Drummer, 252 pp.

Polhemus, J.T., and H.C. Chapman. 1979. Family Saldidae/shore bugs. *In* A.S. Menke (editor), The semiaquatic and aquatic Hemiptera of California (Heteroptera: Hemiptera). Bulletin of the California Insect Survey 21: 16–33.

Ronquist, F. 1997. Dispersal-vicariance analysis: a new approach to the quantification of historical biogeography. Systematic Biology 46: 195–203.

Rosen, D.E. 1975. A vicariance model of Caribbean biogeography. Systematic Zoology 24: 431–464.

Schuh, R.T. 2000. Biological systematics: principles and applications. Ithaca, NY: Cornell University Press, 236 pp.

Schuh, R.T., B. Galil, and J.T. Polhemus. 1987. Catalog and bibliography of Leptopodomorpha (Heteroptera). Bulletin of the American Museum of Natural History 185(3): 243–406.

Schuh, R.T., and J.T. Polhemus. 1980. Analysis of taxonomic congruence among morphological, ecological, and biogeographic data sets for the Leptopodomorpha (Hemiptera). Systematic Zoology 29: 1–26.

Schuh, R.T., and J.A. Slater. 1995. True bugs of the world (Hemiptera: Heteroptera): classification and natural history. Ithaca, NY: Cornell University Press, 336 pp.

Sclater, P.L. 1858. On the general geographical distribution of the members of the class Aves. Journal of the Linnaean Society of London Zoology 2: 130–145.

Szumik, C., F. Cuezzo, P. Goloboff, and A. Chalup. 2002. An optimality criterion to determine areas of endemism. Systematic Biology 51: 806–816.

Szumik, C., and P. Goloboff. 2004. Areas of endemism: an improved optimality criterion. Systematic Biology 53: 968–977.

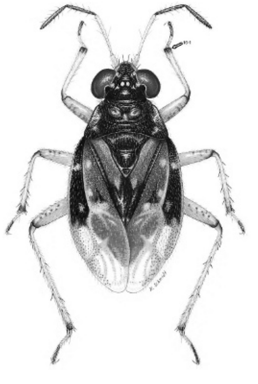
Torres, B.A. 1954. Una nueva especie de sáldido de Tierra del Fuego (Hemiptera - Saldidae). Notas del Museo Universidad Eva Peron 17, Zoologia 149: 87–93.

Vinokurov, N.N. 2004. A new genus and species of the family Saldidae from China (Heteroptera). Zoosystematica Rossica 13: 9–13.

Weirauch, C. 2008. Cladistic analysis of Reduviidae (Heteroptera: Cimicomorpha) based on morphological characters. Systematic Entomology 33: 229–274.

Wygodzinsky, P., and S. Coscarón. 1989. Revision of the black fly genus *Gigantodax* (Diptera, Simuliidae). Bulletin of the American Museum of Natural History 189: 1–269.

PLATES



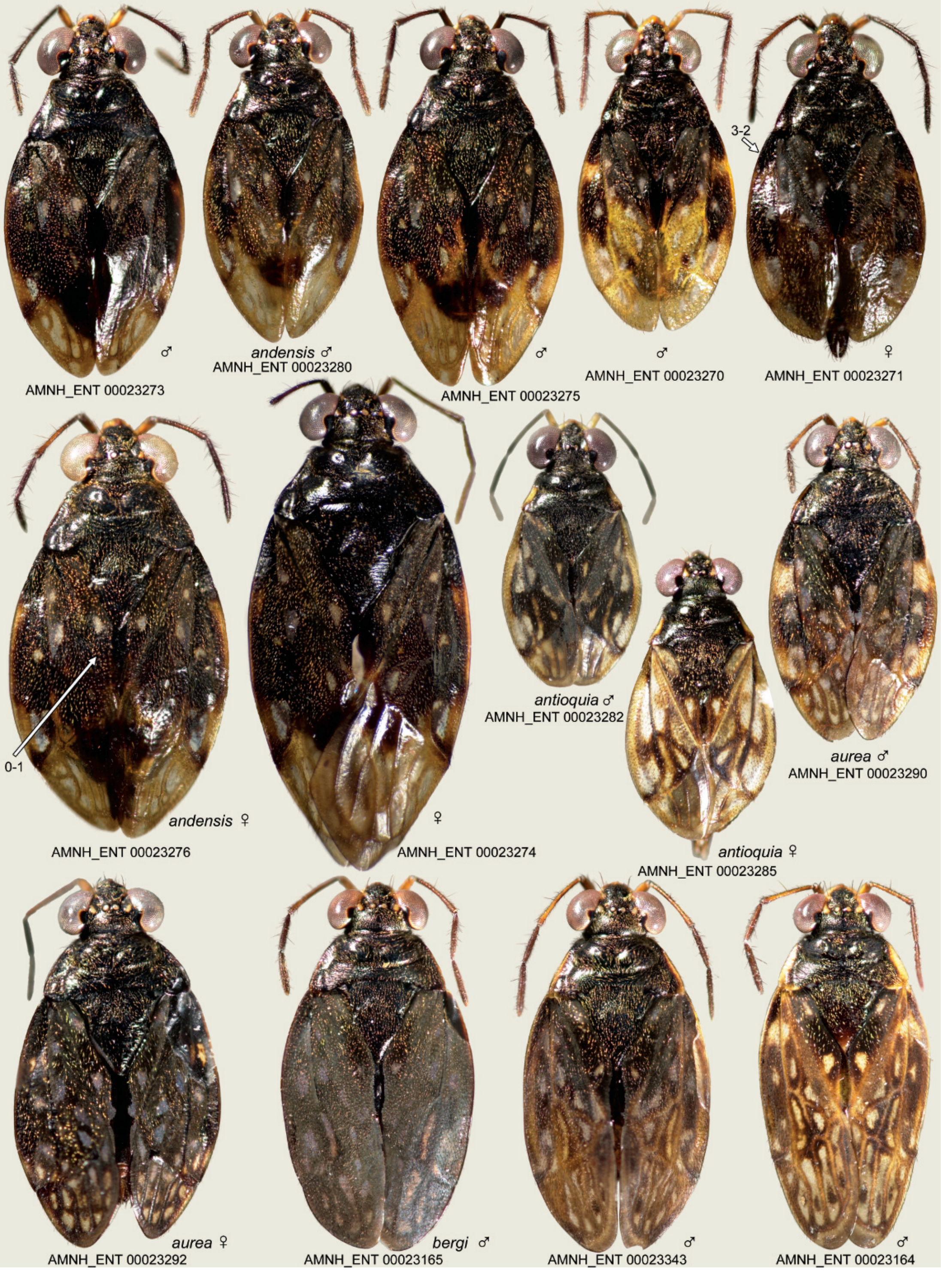


Plate 1. Habitus views of *Pseudosaldula* spp.: *andensis–bergi* males.

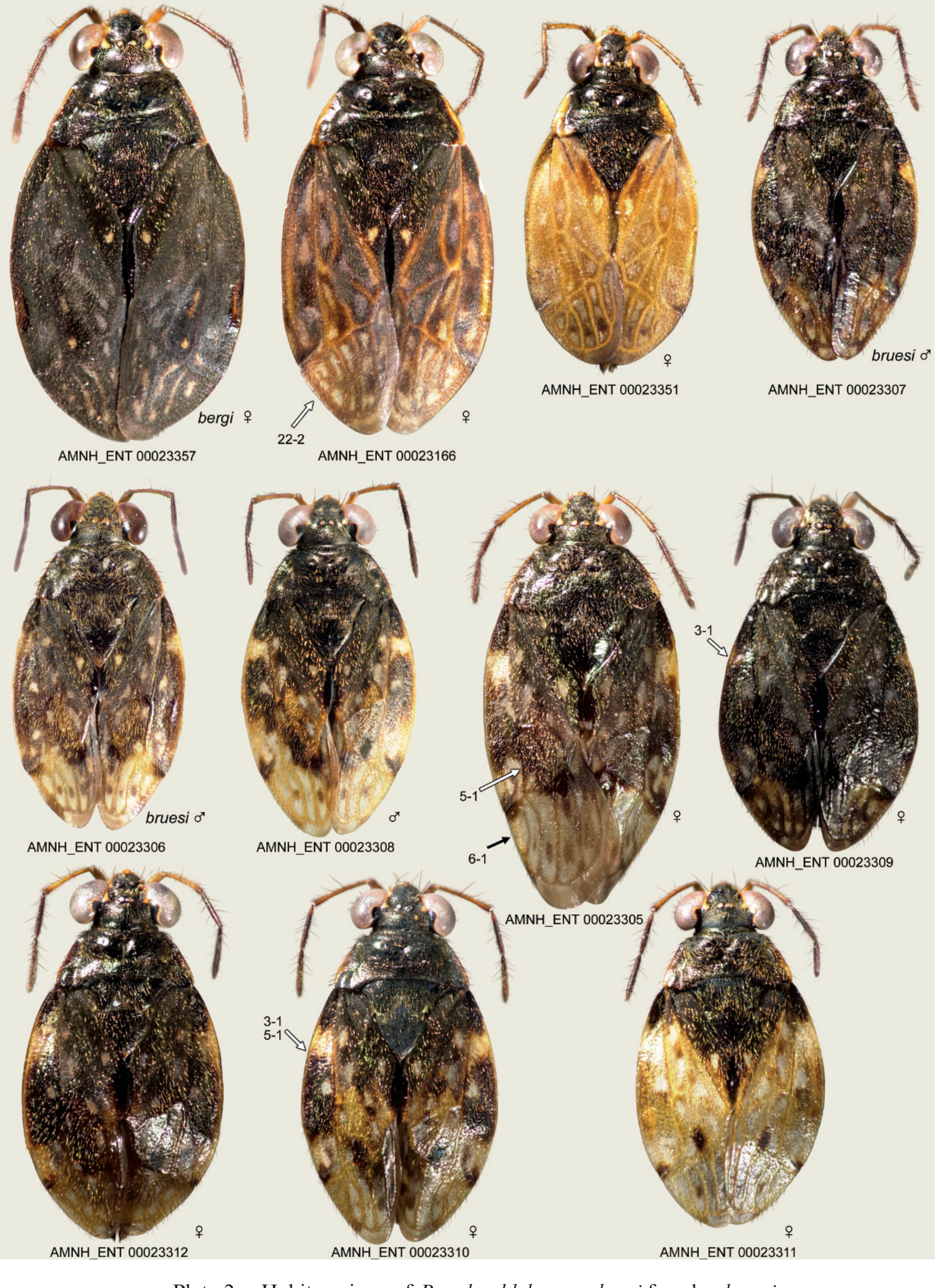


Plate 2. Habitus views of *Pseudosaldula* spp.: *bergi* females–*bruesi*.

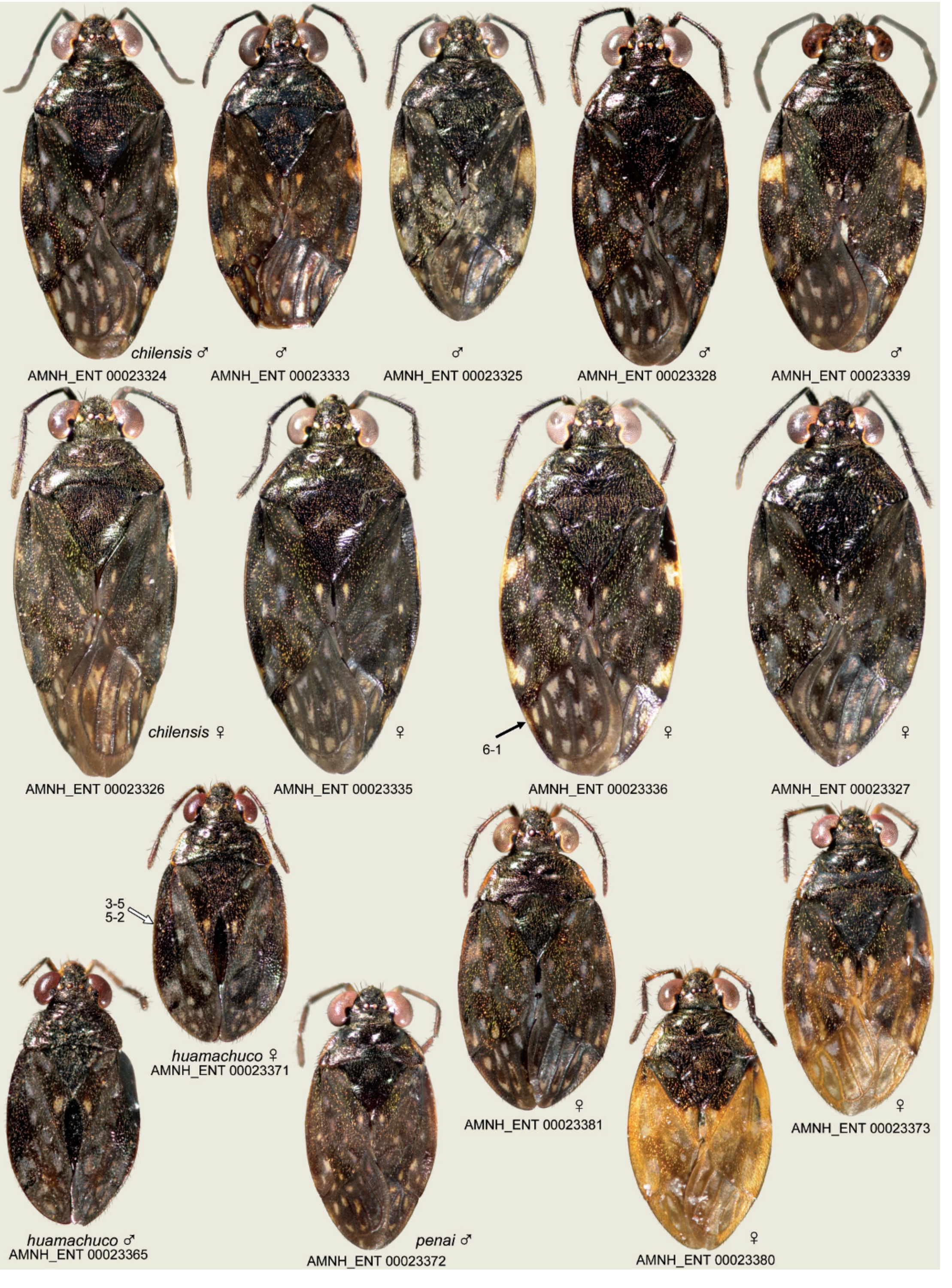


Plate 3. Habitus views of *Pseudosaldula* spp.: *chilensis*–*penai*.

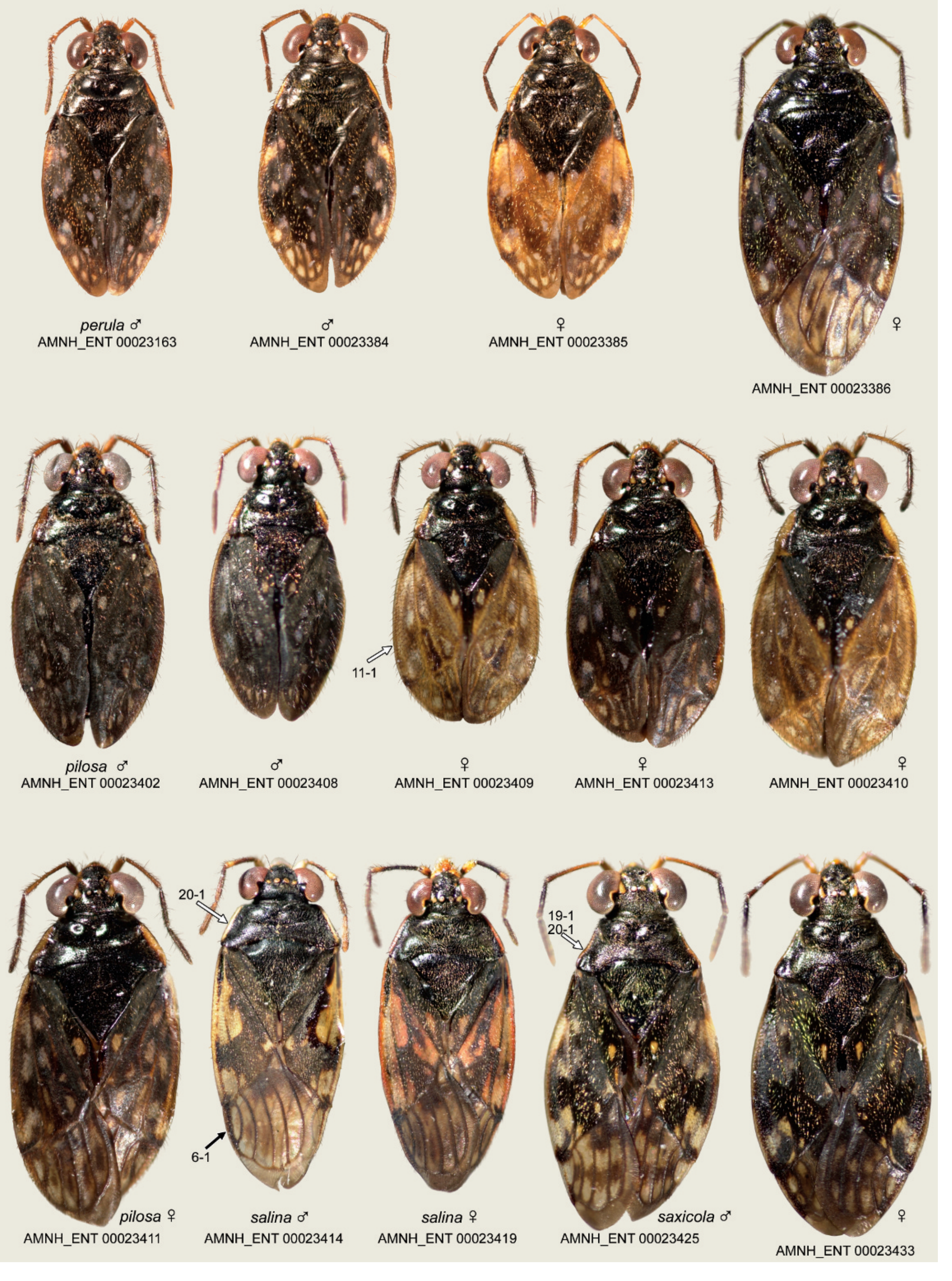


Plate 4. Habitus views of *Pseudosaldula* spp.: *perula–saxicola*.

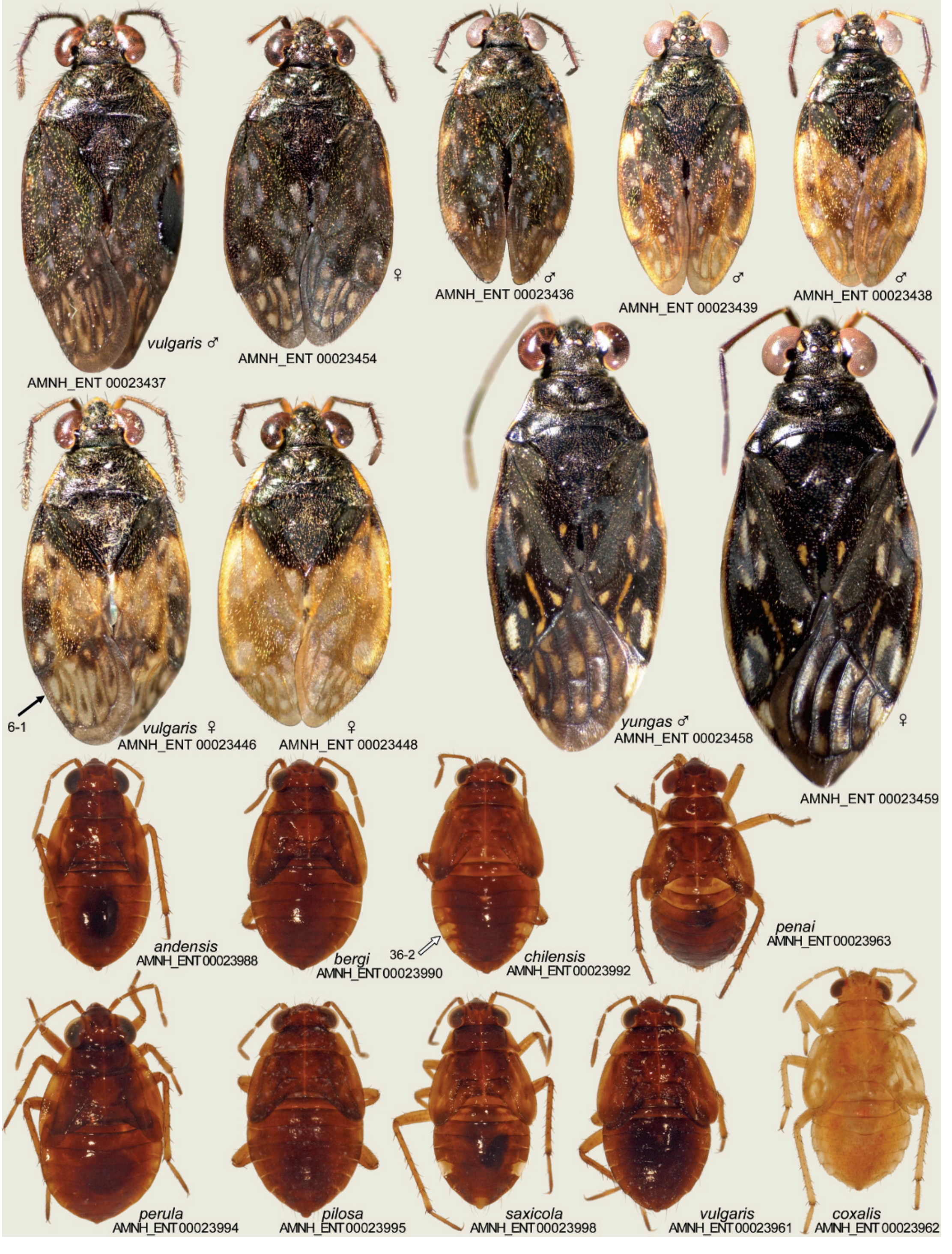


Plate 5. Habitus views of *Pseudosaldula* spp. adults: *vulgaris*–*yungas*. Habitus views of *Pseudosaldula* nymphs.

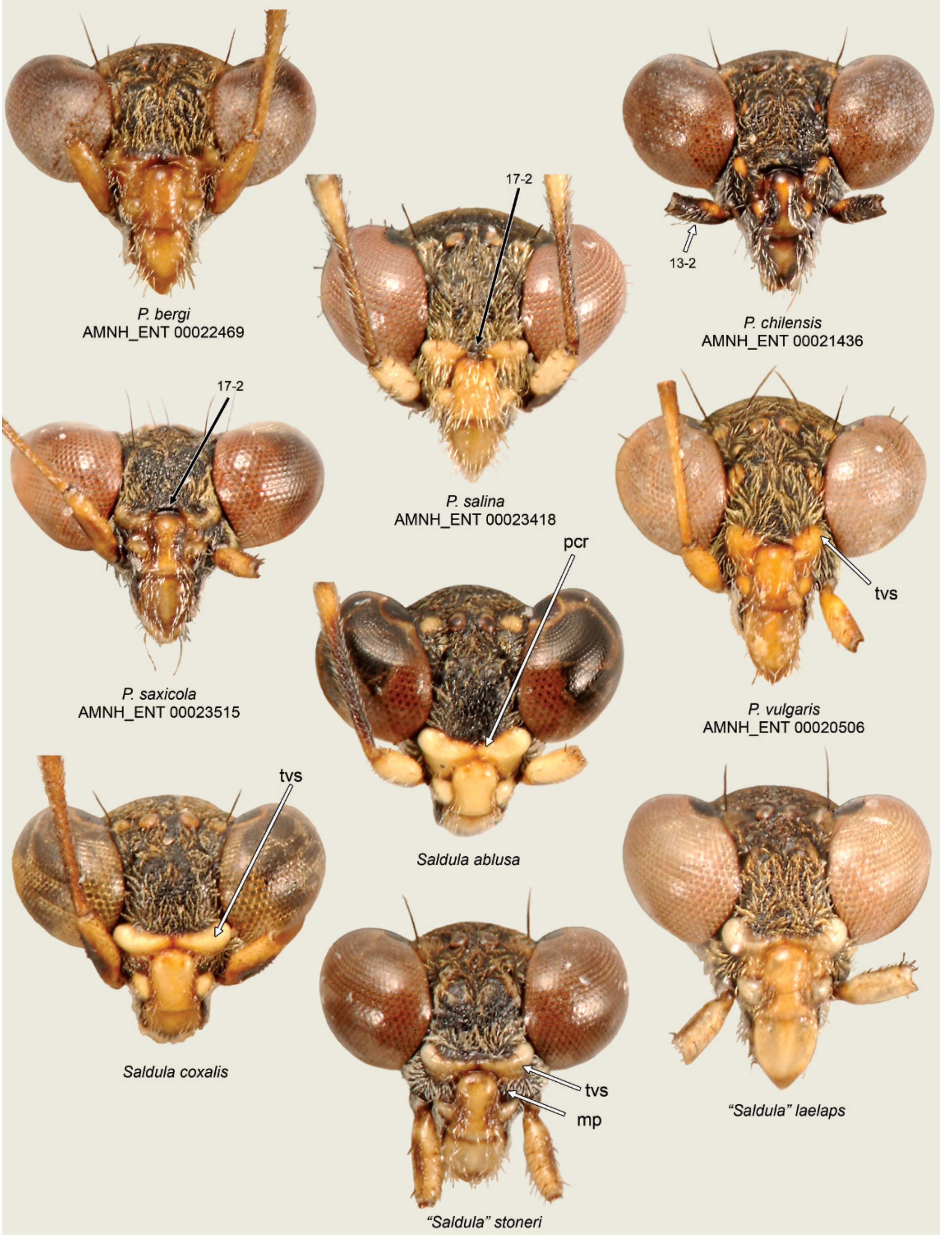


Plate 6. Facial views of *Pseudosaldula* and *Saldula* spp., showing postclypeal region and coloration of antennal segment 1. **tvs,** transverse swelling; **pcr,** postclypeal region.

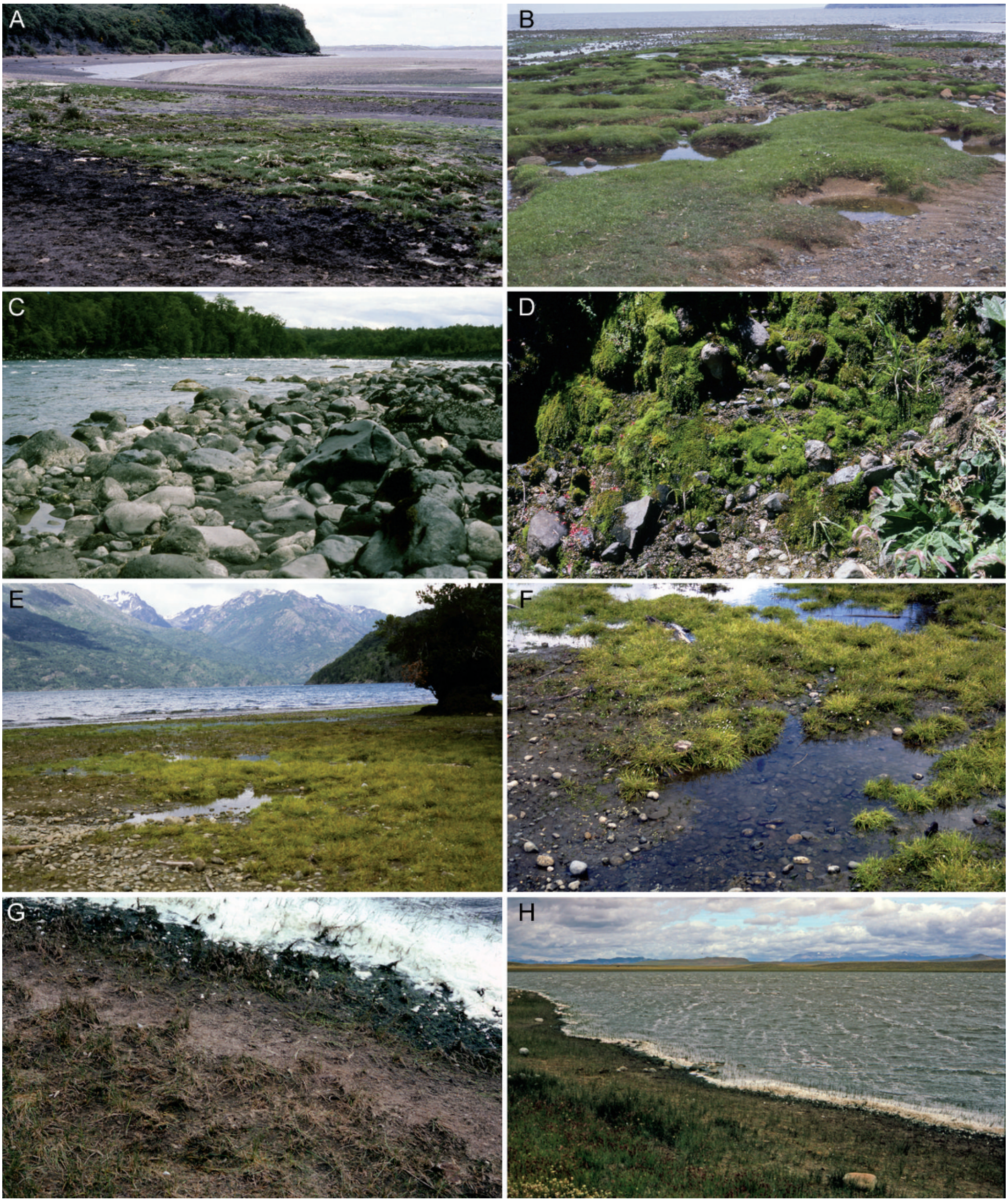


Plate 7. Habitat photos for *Pseudosaldula* spp. **A.** Chile: Los Lagos: Chiloe: 4 km SE of Rilan at Aquanto, sea level, November 20, 1981, *P. bergi*. **B.** Same as A, detail. **C.** Chile: Los Lagos: Llanquihue: 2.5 km W of Saltos de Petrohue, Rio Petrohue, 190 m, December 13, 1981, *P. chilensis*. **D.** Chile: Los Lagos: Palena: 70 km S of Chaiten, 500 m, January 18, 1986, *P. chilensis*. **E.** Argentina: Chubut: N shore of Lago Puela, 160 m, January 15, 1985, *P. chilensis*, *P. pilosa*. **F.** Same as E, detail. **G.** Argentina: Chubut: 108 km W of Rio Mayo, 720 m, small patagonian lake, January 21, 1986, *P. pilosa*. **H.** Same as G, detail.

Plate 8. Habitat photos for *Pseudosaldula* spp. **A.** Argentina: Tucumán: 36 km NW of Monteros, 1300 m, January 3, 1982, *P. saxicola*, with B.M. Massie. **B.** Same as A, detail of boulders in stream. **C.** Argentina: Tucumán: 28 km SE of Amaichá del Valle, 2800 m, January 2, 1982, *P. pilosa*. **D.** Same as C, detail. **E.** Argentina: Tucumán: 15 km NW of Tafi del Valle, 2800 m, January 3, 1982, *P. aurea*, *P. pilosa*. **F.** Ecuador: Cotopaxi: 9 km W of Pujilli, 3300 m, February 2, 1976, *P. andensis*. **G.** Same as F, detail. **H.** Ecuador: Napo: 10 km E of Papallacta, 2620 m, February 5, 1976, macropterous and bracypterous specimens of *P. andensis*.