ON *GYROPUS PARVUS PARVUS* (EWING, 1924) AND *PHTHEIROPOIOS RIONEGRENSIS* SP.N. (PHTHIRAPTERA, AMBLYCERA, GYROPIDAE), PARASITIC ON *CTENOMYS HAIGI* THOMAS, 1919 (MAMMALIA, RODENTIA, CTENOMYIDAE)

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ABSTRACT

Phtheiropoios rionegrensis sp. n. is described from specimens collected off *Ctenomys haigi, C. mendocinus* and *C. australis* in Argentina. The male genitalia of *Gyropus parvus parvus* (Ewing, 1924) is redescribed. The sites of oviposition, the external architecture of the eggs, the "hatching organ" of the embryo and synoxenic occurrence throw the geographical ranges of their hosts are studied.

KEYWORDS. *Phtheiropoios, Gyropus, Ctenomys,* eggs, synoxenia, Argentina.

INTRODUCTION

This paper deals with Amblycera (Insecta: Phthiraptera) parasitic on *Ctenomys* species (Mammalia: Rodentia: Ctenomyidae) from different localities of Mendoza and Rio Negro Provinces, Argentina. The relevant features of the imagoes of *Gyropus parvus parvus* (Ewing, 1924) and *Phtheiropoios rionegrensis* sp. n. (Gyropidae: Gyropinae) are illustrated and described, as well as the chorionic external architecture, egg-laying sites on the rodent hosts and geographical ranges.

MATERIAL AND METHODS

Most of the adult specimens were obtained alive from different *Ctenomys* species, also trapped alive. A minor amount was taken from museum study skins housed at Museo de La Plata (MLPA), La'Plata, Buenos Aires, Argentina, which were used as a secondary source of lice only.

Lice were fixed in ethanol-acetic 1:1 vol/vol mixture. Most of them were mounted on slides following the procedure described by CASTRO & CICCHINO (1978), using Eosin W as staining agent.

The eggs were taken from the different *Ctenomys* species, killed with commercial ether, air-dried during two weeks, and then cleaned during 20-30 seconds in acetone 100% by means of an ultrasonic vibrator. After, they were mounted on several stubs in different positions, coated with gold-palladium in a Jeol vacuum metallizer, and subsequently examined with a Jeol T-100 Scanning Electron Microscope (SEM). Measurements: under the SEM, by means of the digital scale given authomatically at different magnifications. Under the light

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microscope, using an appropriate callibrated eyepiece. All measurements are given in micrometers (µm).

Pictures: for the SEM photographs a Kodak Verichrome Pan R VP 120 (ASA 125/22 DIN) film was used. Drawings were traced by means of a camera lucida. All SEM pictures were stored in an iconographic collection and were available from the authors.

Gyropus parvus parvus (Ewing, 1924)

(Figs. 1-3, 14-24, 31-35)

General habitus of male and female matching those described by WERNECK (1936, 1948). For general remarks and hosts associations see CASTRO **et al.** (1987). Male genitalia typical, with a large and complicated penis (fig. 1), pseudopenis U-shaped (figs. 1,2), paramera long and curved outwardly, their tips extending beyond the basal plate. A lightly pigmented and poorly defined ventral plate (fig. 3) extends between the paramera, being difficult to see in whole-mounted specimens.

Type host: *Ctenomys magellanicus* Bennett, 1835.

Other hosts records (include previous records by EWING (1924), WERNECK (1936, 1948), CASTRO **et al.** (1987) and CASTRO & CICCHINO (1987) and those from the present study): *Ctenomys mendocinus* Philippi, 1869; *C. talarum talarum* Thomas, 1898; *C. porteousi* Thomas, 1916; *C. australis* Rusconi, 1934; *C. sericeus* J. A. Allen, 1903; *C. opimus* Wagner 1900 and *Ctenomys* sp. from Villa Mercedes, Argentina.

Specimens examined. Numerous males, females and nymphs from the following *Ctenomys* species: *C. opimus*, Tilcara, Jujuy Province; *C. mendocinus,* Paramillos (Las Heras), Cerro Melón (Las Heras), La Punilla (Luján) and Malargüe, Mendoza Province; *Ctenomys* sp., Villa Mercedes, San Luis Province; *C. talarum talarum*, Magdalena, Buenos Aires Province; *C. australis*, Necochea and Monte Hermoso, Buenos Aires Province; *C. porteousi*, Bonifacio (Guaminí) and Chasicó (Villarino), Buenos Aires Province; and *C. haigi*, Trapalcó (Avellaneda), Río Negro Province and El Maitén (Cushamen), Chubut Province. See figure 35.

Phtheiropoios rionegrensis sp. n.

(Figs. 4-7, 9, 12, 25-31, 33, 35)

Male: general habitus and chaetotaxy much as for *P. latipollicaris* (Ewing, 1924) and *P. forficulatus* (Neumann, 1912), differing as follows: (1) from *P. latipollicaris* (figs. 8, 11): forficulae smaller and with a shorter "toe", basal plate narrower (fig. 4), pseudopenis distinctly shaped (fig. 6), paramera shorter and structure of the penis (fig. 12).

Female: reminiscent of *P. latipollicaris*, but with tendence to be noticeably smaller in all somatic dimensions.

Type host: *Ctenomys haigi* Thomas, 1919.

Other hosts: *C. mendocinus* and *C. australis*.

Material examined. Holotype ♂, 14 ♂ and 14 ♀ paratypes, all them from the type host, Trapalcó, Avellaneda, Río Negro Province, Argentina (MLPA). Other specimens: males, females and nymphs, collected off *C. mendocinus* from La Punilla (Dto. Luján), El Chihuido and El Peralito (Dto. Malargüe), Mendoza Province (MLPA); off *C. australis* from Necochea, Buenos Aires Province (MLPA).

Sites of oviposition. *Gyropus p. parvus* two dissimilar patterns of oviposition have been observed: (1) in isolated colonies in *Ctenomys t. talarum* - two individual hosts examined showing similar pattern (fig. 34) - the eggs are laid in the hairs of the ileosacral area; (2) when synoxenic with *Phtheiropoios* species the egg laying sites are displaced more periphericaly (*C. haigi*, fig. 31) or around the ears and dorsum and venter of the forelegs (*C. porteousi*, fig. 32), or scattered over the abdominal surface (in some individuals of *C. haigi*, fig. 31), or combinations of the patterns described above (*C. haigi* and *C. australis*, figs. 31, 33). *Phtheiropoios rionegrensis* sp. n. in isolated colonies or when synoxenic with *G. p. parvus*, the eggs are unvariably laid in the hairs of the ileosacral area, sometimes extended to the pubian and perineal areas (figs. 31,33).

External chorionic architecture of the eggs. The chorion of the eggs is formed wholly by the follicle cells of the polytrophic ovariola. After the deposition of the endochorionic layer over the vitelline cuticle, the exochorionic layer begins to be secreted. This layer, in many cases, is not produced uniformly, but is deposited more rapidly at the edges of the follicle cells than at their central area and, in consequence, some kinds of "pits", deep areolae or areas appear in the chorionic surface opposite to each follicle cell. By this reason, the "pitted", "fuzzy", areolate or reticulate external surface of the egg is a result of the imprints of the follicle cells which produce it, as has been pointed out, among others, by BEAMENT (1946) for Hemiptera.

The external features and measurements of the eggs of both species are very distinctive (table I). Two kinds of operculi are found, here typified as follows: (1) "dome-shaped operculum", found in *G. p. parvus* (figs. 19, 20, 22), with an uniformly curved surface; (2) "capitate operculum", found in *P. rionegrensis* sp. n. (figs. 25, 26, 28), characterized by its polar half much enlarged and produced, naming this enlargement "capitulum".

Hatching organ of the embryo. The hatching organ is a cuticular structure of the embryonic cuticle consisting in a basal and feebly sclerotized plate variously shaped, with a number of spines, tubercles, lancets and/or lancet-shaped blades. The true function of these "bursters" is to tear the vitelline membrane (SYKES & WIGGLESWORTH, 1931; HINTON, 1977). The chorion is then broken along a preformed line of weakness called the abcission line by swallowing pressure generated by the embryo by pumping hemolymph forward by rythmic contractions of the abdomen, and by filling the tracheal system with air (CHAPMAN, 1969). As the embryonic cuticle is shed inmediately after hatching, it remains attached inside the amphora (SYKES & WIGGLESWORTH, 1931).

The hatching organ of *G. p. parvus* and *P. rionegrensis*, sp. n., are very similar one another, and are essentially identical in shape and structure to that of *P. tucumanus* Cicchino, 1990 (CICCHINO, 1990): a bottle-like shaped and tiny pigmented plate having three well defined sets of spines, lancets or tubercles (figs. 15-18), here named: (1) apical teeth, and inconspicuous number of small tubercles, with or without a central stronger tubercle or spine, located at the bottom of the plate; (2) lateral teeth, long and slightly bent upward horn-like teeth placed laterally, and (3) central tooth, one short, strong and spine-like tooth placed at the top.

Table I: Measurements and distinctive features of the eggs of *Gyropus parvus parvus* (Ewing 1924) and *Phtheiropoios rionegrensis*, sp. n.

egg	*Gyropus p. parvus*	*Phtheiropoios rionegrensis,* sp. n
size (µm)	Length = 537-586 Width= 224-244	Length= 634-683 Width= 293-317
kind of operculum	Dome-shaped, with rugose and "pitted" surface (figs. 19-22)	Capitate, with smooth surface (figs. 25, 26, 28)
opercular callus	Not produced (figs. 14, 19, 20, 22, 23)	Greatly produced outwardly (figs. 25, 26, 28, 29)
number of air chambers	13-16, clearly coalescent with the opercular callus (figs. 23, 24)	15-16, not definitely coalescent with the opercular callus (figs. 29,30)
position of the micropyla	Central (figs. 23, 24)	Excentric, displaced against the opercular wall (figs. 29, 30)
callus of the amphora	Incipient, with finger-like outgrowth of various lengths (figs. 14, 20)	Fully developed, delimiting a circumferential groove, and lacking projections of any kind (figs. 26, 28).
kind of mesh of the amphora	Very thick, delimiting many small and nearly circular areolae (fig. 20)	With a slender appearance, delimiting large and almost isodiamentric exagonal areas (figs. 26, 27).

Occurrence on the hosts. The term oligoxenic is here used in the sense originally proposed by SANDGROUND (1929), and the term synoxenic, erected by WENZEL **et al**. (1966), in a slightly modified sense in order to include not only two or more species in the same genus but two or more species belonging to two closely related genera, as undoubtly *Gyropus* and *Phtheiropoios* are.

G. p. parvus is an ubiquitous, oligoxenic subspecies found in at least ten *Ctenomys* species, but future collections probably should enlarge considerably this number. Except for isolated colonies parasitic on *C. t. talarum* (no other lice are known from this host), in most cases it is synoxenic. with one or even two *Phtheiropoios* species in the same individual host where may exists also an *Eulinognathus* species (Anoplura: Polyplacidae). Its hosts range from central Jujuy in Argentina south to Gregory Bay, Isla Grande de Tierra del Fuego in Chile: *C. opimus, C. mendocinus. C. porteousi, C. australis, C. t. talarum, C. haigi, C. colburni, C. sericeus, C. magellanicus* and *Ctenomys* sp. from Villa Mercedes, San Luis Province, Argentina (table II).

P. rionegrensis, sp. n., show a different pattern. Taking into account the available data it seems to be an oligoxenic species restricted to the *C. mendocinus* and *C. australis* species complexes over a geographic arch ranging from northern Mendoza south to Río

Table II. Synoxenisms of *Gyropus parvus parvus* (Ewing, 1924) with *Phtheiropoios* or *Eulinognathus* species in different host and localities in Argentina and Chile.

HOST AND LOCALITY	SYNOXENIC WITH	SOURCE OF INFORMATION
Ctenomys colburni Huanuluán, El Cuy, Río Negro, Argentina	*Phtheiropoios* sp. (1)	EWING (1924) WERNECK (1948)
Ctenomys opimus Tilcara, Jujuy, Argentina	*Phtheiropoios nematophallus* (Werneck, 1935)	new record
Ctenomys australis Necochea, Buenos Aires, Argentina	*Phtheiropoios rionegrensis*, sp.n. Phtheiropoios forticulatus (Neumann, 1912)	new record
Ctenomys porteousi Bonifacio, Guaminí Buenos Aires, Argentina	*Phtheiropoios* sp. (1)	CASTRO **et al.** (1987) CASTRO & CICCHINO (1987) Present study
Ctenomys porteousi Chasicó, Villarino, Buenos Aires, Argentina	*Eulinognathus torquatus* (Castro, 1982)	new record
Ctenomys sp. Villa Mercedes, San Luis, Argentina	*Phtheiropoios* sp. (1)	new record
Ctenomys mendocinus Santa Rosa, Mendoza, Argentina	*Phtheiropoios forficulatus* (Neumann, 1912)	new record
Ctenomys haigi Trapalcó, Avellaneda, Río Negro, Argentina	*Phtheiropoios rionegrensis*, sp. n.	new record
Ctenomys haigi El Maitén, Cushamen, Chubut, Argentina	*Phtheiropoios* sp. (1)	new record
Ctenomys mendocinus Las Heras, Mendoza, Argentina	*Phtheiropoios forficulatus* (Neumann, 1912)	new record
Ctenomys magellanicus Gregory Bay, Magallanes, Chile	*Phtheiropoios pollicaris* (Ewing, 1924) *Phtheiropoios latipollicaris* (Ewing, 1924)	WERNECK (1948)
Ctenomys sericeus Alto Río Chico, Santa Cruz, Argentina	*Phtheiropoios latipollicaris*	WERNECK (1948)

(1) These populations belong to the same species identified erroneously as *P. latipollicaris* (Ewing, 1924) by CASTRO **et al.** (1987) and by CASTRO & CICCHINO (1987) following somatic features provided by WERNECK (1948).

Negro and Buenos Aires Provinces in Argentina. This species is often synoxenic with *P. forficulatus* in at least two different localities in Mendoza and one in Buenos Aires Provinces, as well as with *P. forficulatus* and *G. p. parvus* at the same time in the latter locality. It is also synoxenic with *G. p. parvus* alone in at least one locality in north Rio Negro Province (fig. 35).

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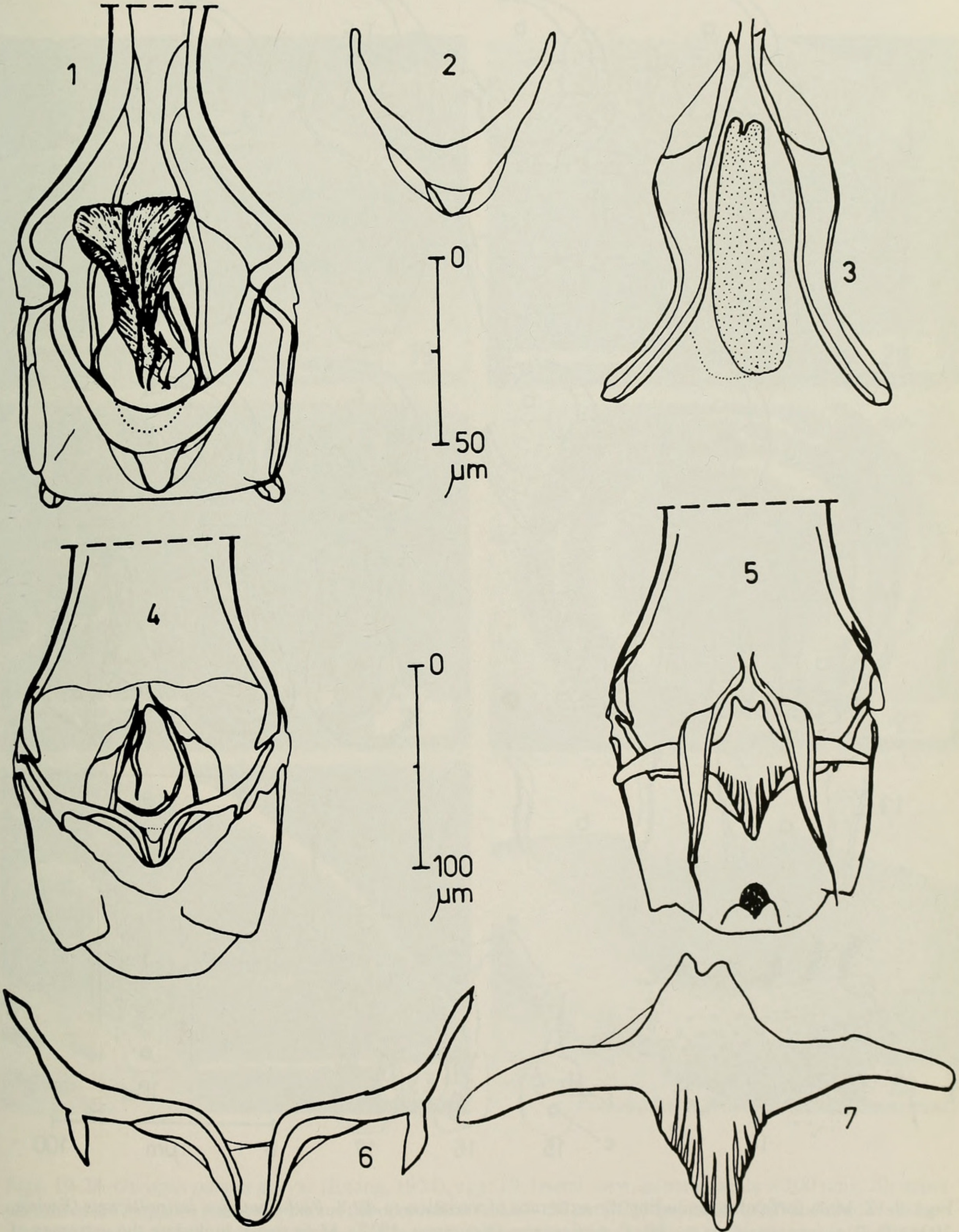
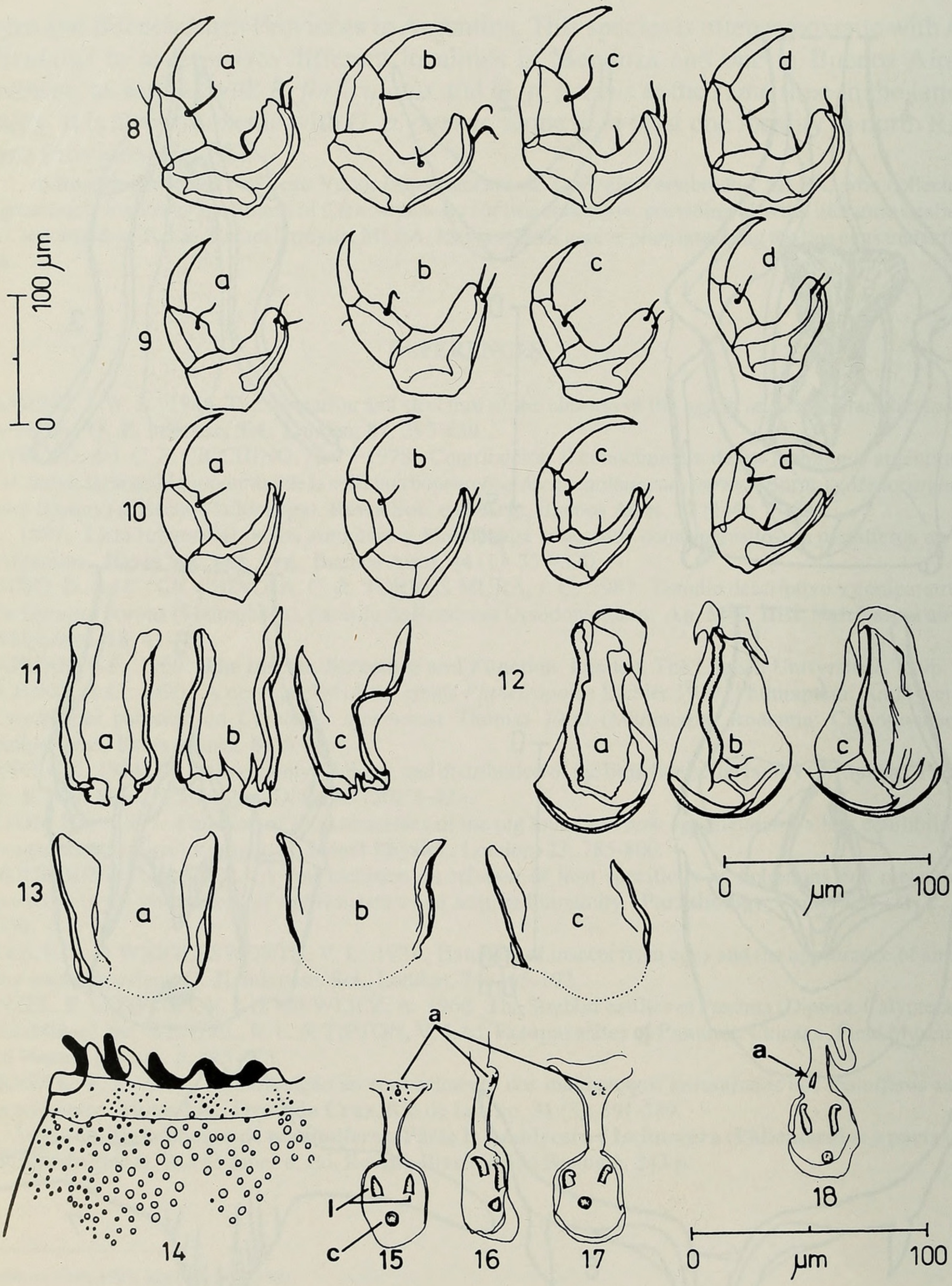
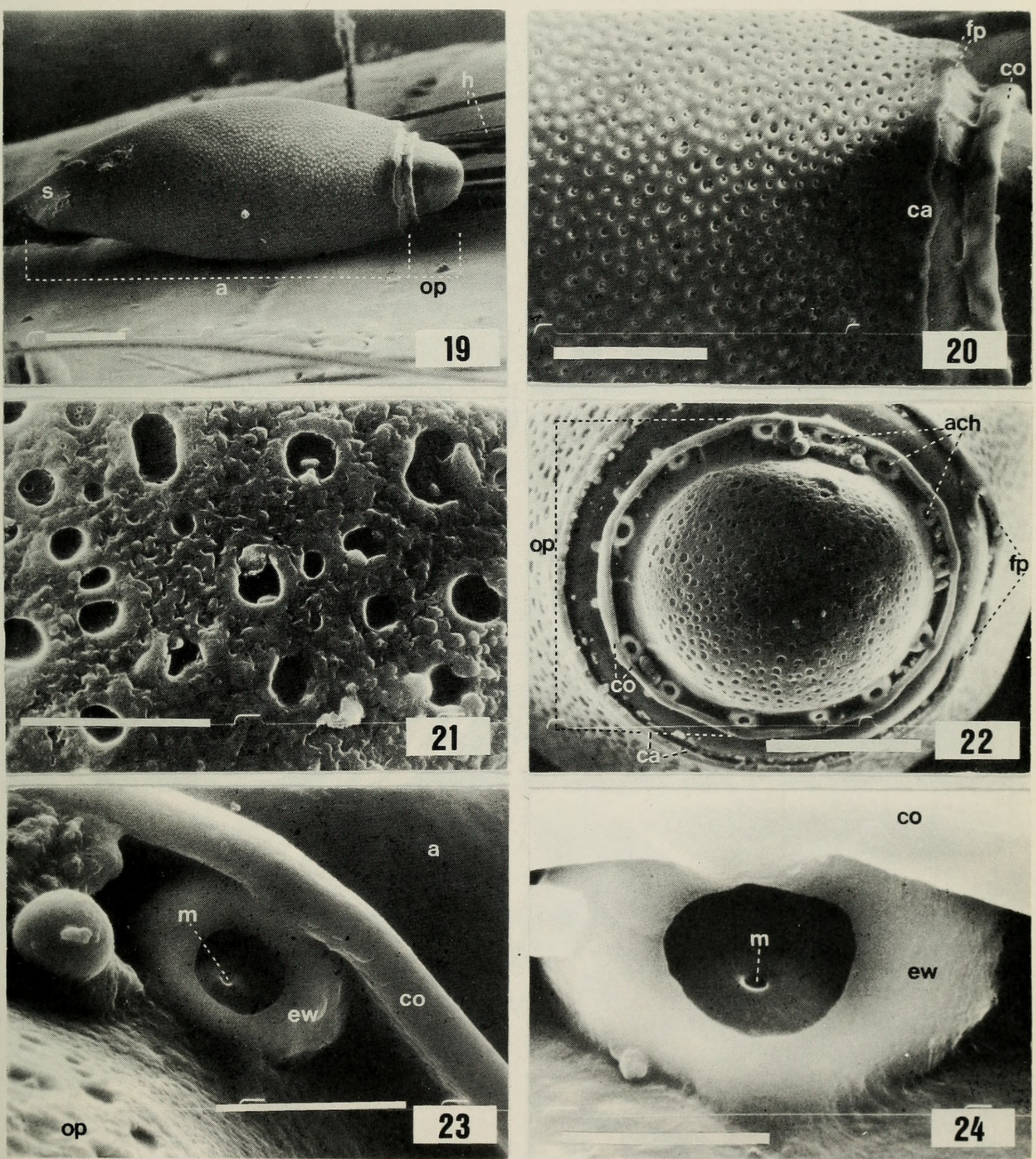


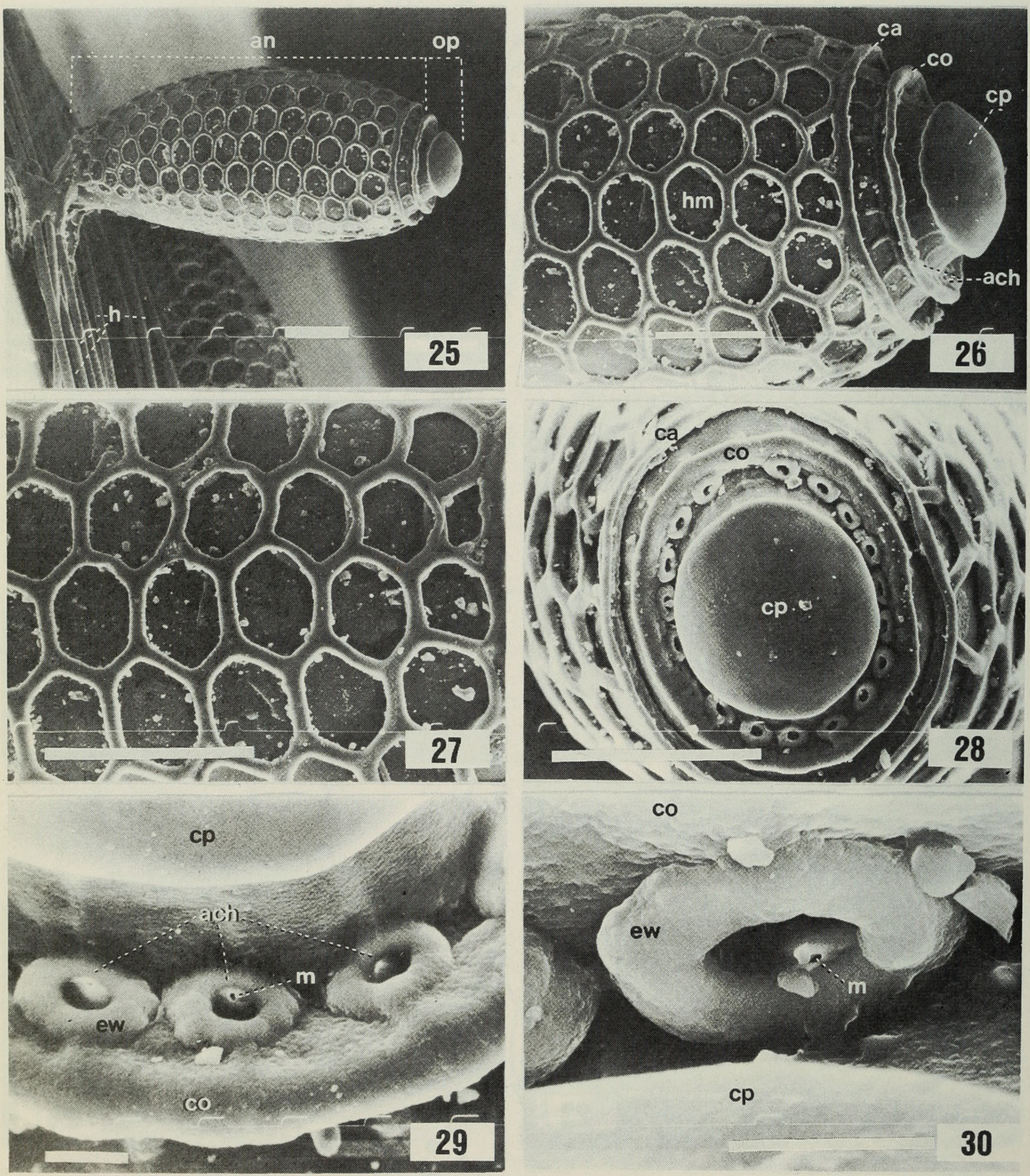
Figs. 1-7. *Gyropus parvus parvus* (Ewing, 1924), male genitalia: 1, dorsal view; 2, pseudopenis; 3, paramera and ventral plate. *Phtheiropoios rionegrensis*, sp. n., male genitalia: 4, dorsal view; 5, ventral view; 6, pseudopenis; 7, ventral sclerite. Figs. 1, 4, 5 and 2,3,6,7, same scale.



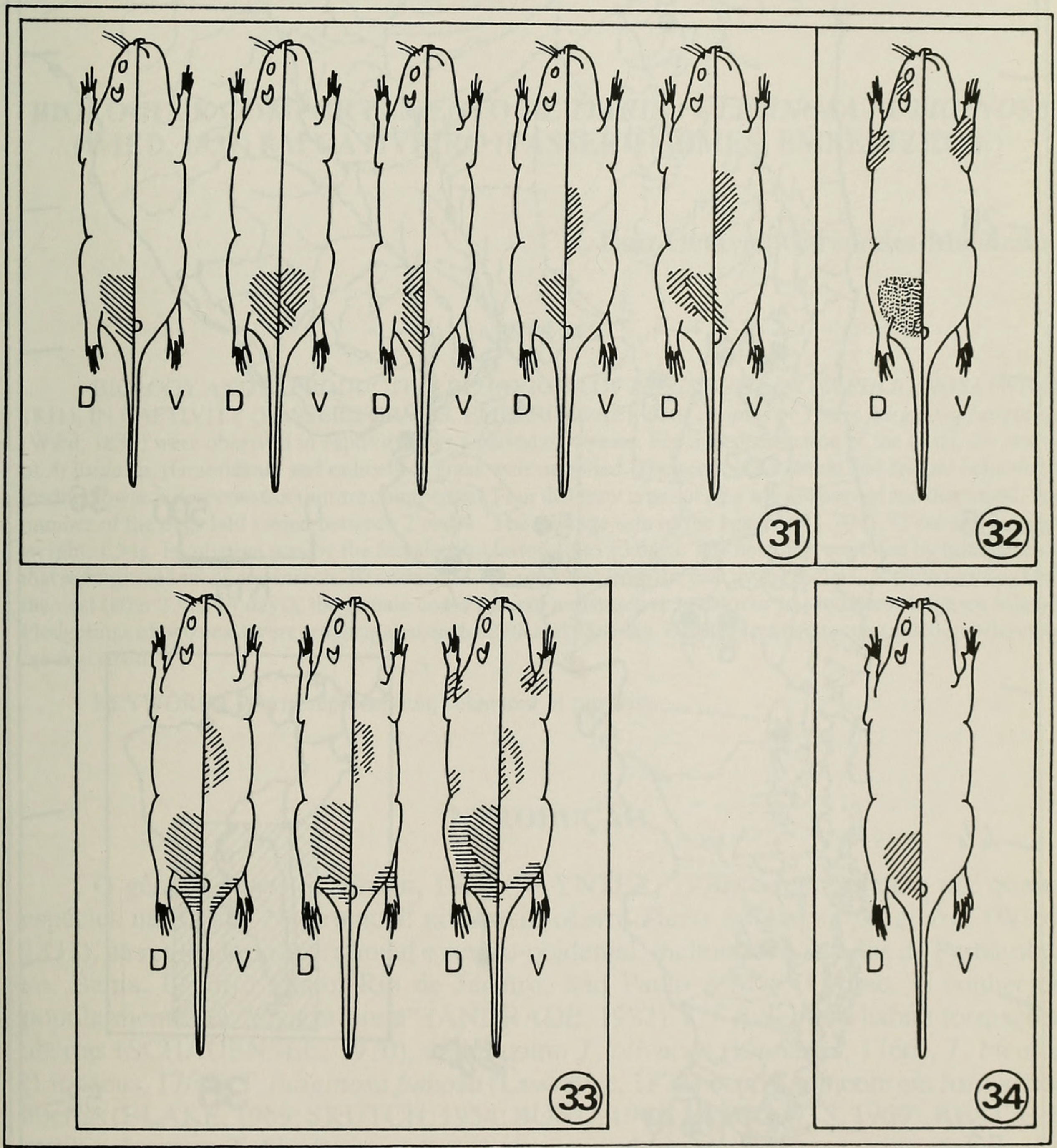
Figs. 8-18. Male forficulae, including the extremes of variation (a-d): 8, *Phtheiropoios latipollicaris* (Ewing, 1924); 9, *P. rionegrensis*, sp. n.; 10, *P. forficulatus* (Neumann, 1912). Male penis, including the extremes of variation (a-c): 11, *Phtheiropoios latipollicaris*; 12, *P. rionegrensis* sp. n.; 13, *P. forficulatus*. *Gyropus parvus parvus* (Ewing, 1924): 14, upper portion of the amphora showing the finger-like outgrowth of the callus, lateral view; 15-18, hatching organ of the embryo; 15, 17, 18 frontal view 16, lateral view (a, apical teeth; c, central tooth; 1, lateral teeth). Figs. 8-10; 11-13; 14-18; same scale.



Figs. 19-24. *Gyropus parvus parvus* (Ewing, 1924), egg: 19, lateral view, general (scale = 100 µm); 20, upper portion of the amphora and lower part of the operculum (scale = 50 µm); 21, opercular "pits" and rugose surface of the operculum (scale = 10 µm); 22, operculum and upper portion of the amphora (polar view) (scale = 50 µm); 23-24, lower portion of the operculum, polar view, showing and air chamber (fig. 23 scale = 10 µm, 24 scale = 5 µm) (a, amphora; ach, air chamber; ca, callus of the amphora; co, callus of the operculum; ew, external wall of the air chamber; fp, finger-like outgrowths of the callus of the amphora; h, host hair; m, micropyla; op, operculum; s, spumaline).



Figs. 25-30. *Phtheiropoios rionegrensis*, sp. n., egg: 25, lateral view, general (scale = 100 μm); 26, apical half of the egg, lateral (scale = 100 μm); 27, exagonal mesh of the amphora (scale = 100 μm); 28, operculum and upper portion of the amphora, polar view (scale = 100 μm); 29, lower portion of the operculum showing three air chambers (scale = 10 μm) (am, amphora; ach, air chamber; ca, callus of the amphora; co, callus of the operculum; cp, capitulum; ew, external wall of the air chamber; h, host hair; hm, exagonal mesh of the amphora; m, micropyla; op, operculum).



Figs. 31-34. Sites of oviposition of *Gyropus parvus parvus* (Ewing, 1924) and *Phtheiropoios rionegrensis*, sp. n., in different *Ctenomys* species, in single infestation or when synoxenic with other Gyropidae: 31, *Ctenomys haigi* from Trapalcó, Río Negro Province, five individuals; 32, *C. porteousi* from Bonifacio, Buenos Aires Province; 33, *C. australis* from Necochea, Buenos Aires Province, three individuals; 34, *C. talarum talarum* from Punta del Indio, Magdalena, Buenos Aires Province; one individual represented but two examined showing the same pattern. (D, dorsal view; V, ventral view of the host).

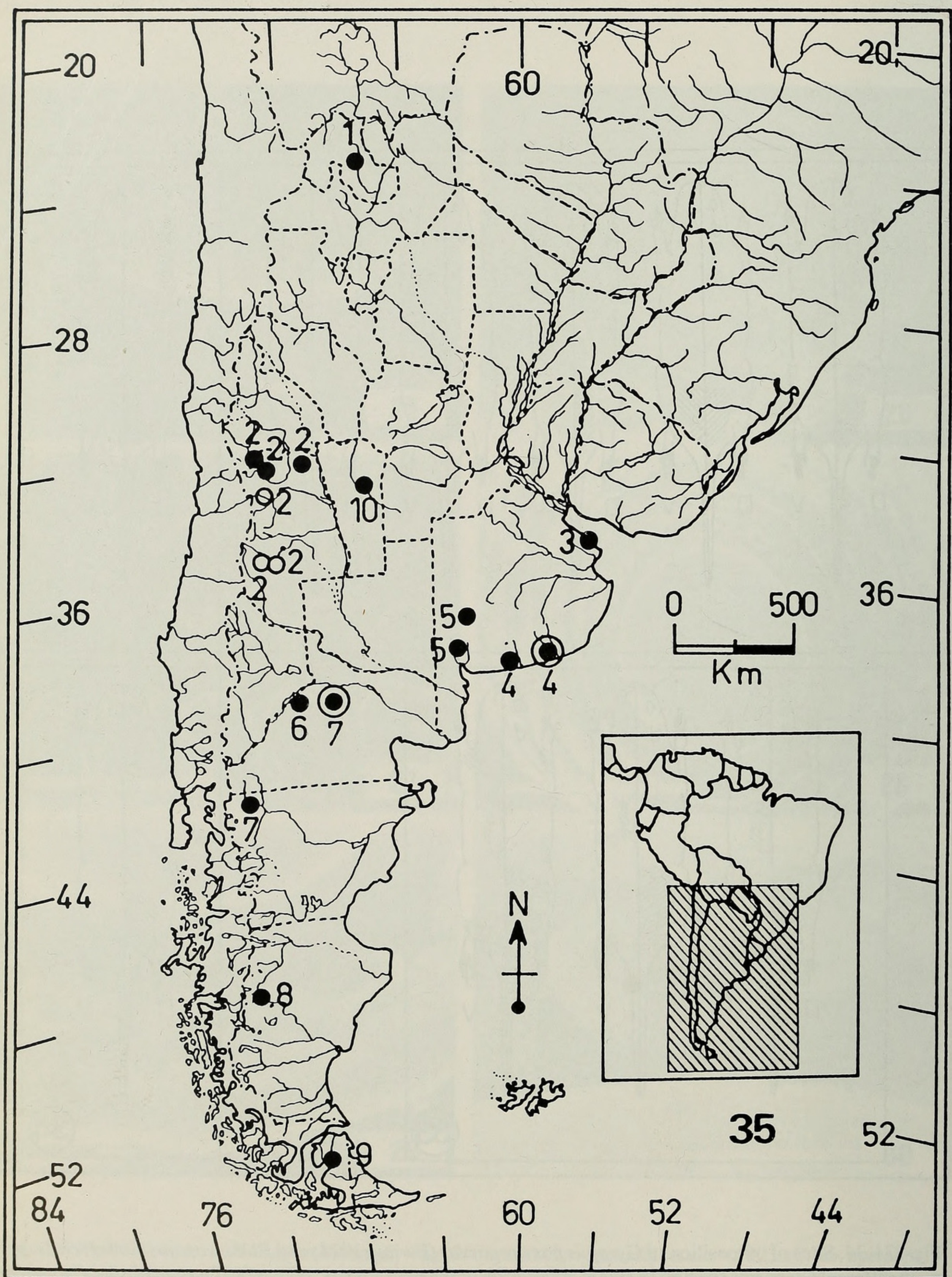


Fig. 35. Distribution and host known for *Gyropus parvus parvus* (Ewing, 1924) (●) and *Phtheiropoios rionegrensis* sp. n. (○), including their synoxenic occurrence (◉). (1, *Ctenomys opimus*; 2, *C. mendocinus;* 3, *C. t. talarum*; 4, C. *australis;* 5, *C. porteousi*; 6, *C. colburni;* 7, *C. haigi;* 8. *C. sericeus;* 9, *C. magellanicus;* 10, *Ctenomys* sp. from Villa Mercedes, San Luis Province).