

PYROSEJIDAE, A NEW FAMILY OF TRIGYNASPID MITES
(ACARI : MESOSTIGMATA : CERCOMEGISTINA) FROM MIDDLE AMERICA

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TAXONOMY
FOREST LITTER
MEXICO
CENTRAL AMERICA
SOUTH AMERICA

ABSTRACT : A new family of trigynaspid mesostigmatic mites, Pyrosejidae, is described on the basis of a group of ten species collected from southern Mexico, Central America, and northern South America. Mites of this group are found in leaf litter habitats of a variety of forest types, including tropical rainforests, cloudforests, and mixed pine-oak forests. *Pyrosejus* n. gen. is described as the type genus of the family, based on material representing the type species, *P. prionotus* n. sp., and 8 undescribed species which are thought to represent 2 species groups. The species of this genus are differentiated from another undescribed species which represents another, undescribed, genus. The characteristics and placement of this family among others of the cohort Cercomegistina are discussed.

TAXONOMIA
HOJARASQUA DE BOSQUES
MEXICO
CENTROAMERICA
SUDAMERICA

RESUMEN : Se describe una nueva familia de ácaros mesostigmaticos, Pyrosejidae, basada en un grupo de 10 especies encontrado al sur de México, Centroamérica y al norte de Sudamérica. Los ácaros de este grupo se encuentran en la hojarasca de diversos tipos de bosque, entre los que se pueden incluir bosques tropicales lluviosos, bosques nublosos, y bosques mixtos de pinos y robles. Se describe *Pyrosejus* n. gen. como género tipo de la familia, basándose en material representativo de la especie tipo *P. prionotus* n. sp. y de 8 especies de este género no descritas, las cuales representan a 2 grupos de especies. Las especies de este género se diferencian de otra no descrita y representante a su vez de otro género no descrito. Se discuten las características y posición de esta familia dentro de otras de la cohorte Cercomegistina.

TAXONOMIE
LITIÈRE FORESTIÈRE
MEXIQUE
AMÉRIQUE CENTRALE
AMÉRIQUE DU SUD

RÉSUMÉ : Une famille nouvelle d'acariens mesostigmatés trigynaspides, les Pyrosejidae, est décrite d'après dix espèces récoltées au sud du Mexique, en Amérique Centrale et au Nord de l'Amérique du Sud. On trouve ces acariens dans la litière de forêts de types variés, comprenant les forêts tropicales humides, les forêts denses et les forêts mixtes pin-chêne. Le genre type de la famille, *Pyrosejus* n. gen., est décrit d'après le matériel de l'espèce type, *P. prionotus* n. sp., et de huit espèces non décrites que l'on croit représenter deux groupes d'espèces. Les espèces de ce genre se différencient d'une autre espèce non décrite représentant un autre genre non décrit. Les caractères et la place de cette famille au sein de la cohorte des Cercomegistina sont discutés.

INTRODUCTION

Mites of the cohort Cercomegistina, in the super-cohort Trigynaspida, are among the most poorly known in the suborder Mesostigmata, both systematically and biologically. This is due in part to

their diversity being centered in tropical regions, and in part to their occurrence primarily in edaphic habitats where their ways of life and interactions with other organisms remain largely uninvestigated. Although cercomegistine mites are thought to comprise a relatively early derivative, generally

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free-living group of Trigynaspida (CAMIN and GORIOSSI 1955, KETHLEY 1977, JOHNSTON 1982), some have adapted to close associations with insects and other arthropods in restricted habitats (KETHLEY 1977, KRANTZ 1978). Current intensification of concern about the increasingly vulnerable and endangered habitats in tropical regions of the world has led to a variety of preliminary investigations of the biodiversity found in forest floor habitats in diverse areas of Middle America. As a result, material of a variety of unusually interesting, undescribed species representing new genera and family-group taxa have become available to us, often accompanied by requests for their determination. In order to provide even preliminarily meaningful reports to collaborators concerning the diversity of taxa submitted for identification, at least family names are essential for database listings.

The present case deals with description of a new family of Cercomegistina for which we have studied material representing 10 species and apparently two genera. The material originated both from preliminary biodiversity surveys initiated by other investigators in Costa Rica and Colombia, and from surveys conducted by the first author and other personnel of the Biological Resources Division, Centre for Land and Biological Resources Research, Agriculture Canada, in southern Mexico, Guatemala, and Costa Rica. All of the material has been used in description of the new family and the more restricted description of the new genus proposed herein. However, due to time constraints and insufficient representatives of the other species, we describe here only one species, as the type species of the new genus on which the family is based nomenclatorially. The primary purpose of this paper is to provide family and genus group categories that can be used for the recording of acarine biodiversity studies in various mesoamerican regions. These categories are not described in a

cladistic context, as such a framework has not as yet been presented in the literature on families of Cercomegistina or of Trigynaspida in general, though the early revision by CAMIN and GORIOSSI (1955) provided a basis for pursuing this. As a secondary purpose, the present paper underscores the need for a cladistic revision of the Cercomegistina, and presents some cladistic aspects in the concluding discussion.

MATERIALS AND METHODS

Mites were extracted, using Berlese-Tullgren funnels, from samples of litter from various forest floor habitats. Specimens were mounted individually in Hoyer's medium, sealed with Glpt insulating varnish on microslides, and deposited in the Canadian National Collection, Agriculture Canada, Ottawa. Morphological observations, measurements, and illustrations were made using compound microscopes equipped with differential interference contrast and phase-contrast optical systems. All measurements, given as micrometers, were made with stage-calibrated eyepiece micrometers. Idiosomal setal notation follows LINDQUIST and EVANS (1965), and leg chaetotaxy follows EVANS (1963, 1965). Distinction between porelike structures of the idiosoma, as either gland pores (solenostomes) or poroids (lyrifissures), is based on the morphological observations of ATHIAS-HENRIOT (1969a, 1969b), substantiated subsequently by the physiological findings of KRANTZ and REDMOND (1987). Notation for these structures, as adenotaxy and poroidotaxy, respectively, follows JOHNSTON and MORAZA (1991). The concepts of previously described families of Trigynaspida generally follow those of CAMIN and GORIOSSI (1955) as updated and modified by KETHLEY (1977) and presented by KRANTZ (1978).

PYROSEJIDAE NEW FAMILY

(Figs. 1-20)

TYPE GENUS : *Pyrosejus* new genus. Family based on adult, deutonymphal and protonymphal material representing 10 species (9 undescribed) in 3 species groups (2 undescribed) which in turn represent 2 genera (1 undescribed).

Diagnosis. Adults of this family resemble those of other families of Cercomegistina (Cercomegistidae Trägårdh 1937, Asternoseiidae Valle 1954, Davacaridae Kethley 1977, Seiodidae Kethley 1977) in having the tectum with anterior serrations or projections but without a median keel, the tritosternum with laciniae fused along most of their length (Seiodidae excepted), tibia I lacking seta *pd-3*, and (Seiodidae excepted) the latigynial shields of the female free, elongate, with membranous mesal margins approaching or overlapping the mesogynial shield. They are distinguished from those of the other families of Cercomegistina by the following combination of characters : idiosoma with two separate, subequal dorsal shields of which the podonotal shield holotrichous or slightly hypotrichous, the opisthonotal shield hypotrichous ; with pair of distinct marginal shields, these also hypotrichous, bearing some of lateral *s-S* and all of marginal *r-R* setae, and united on either side anteriorly to podonotal shield and caudally to opisthonotal shield ; female with sternal setae 1 on separate jugularia or on tetartosternum, remainder of sternal shielding fragmented ; male either with jugularia present as in female and with remainder of sternogenital shielding fragmented or entire, or with tetartosternum contiguous with remainder of sternogenital shield which is entire ; female latigynial shields weakly sclerotized, with but 1 pair of setae ; female mesogynial shield moderately small but well sclerotized, separate from other shields or contiguous posteriorly with ventrianal shield ; ventrianal shield holotrichous, expansive, continuously

united with peritrematal-exopodal shields anterolaterally and with marginal shields laterally, and coalesced with posterior dorsal shield caudally ; subcapitulum with a pair of "paralaciniae" laterad internal malae ; leg I usually with paired claws ; coxa IV with alveolar vestige of a second seta. The losses of setae *pv-3* on femur I and *al-2* on femur IV are unique to this family among described families of Cercomegistina.

Description. Adults of small to medium size (idiosomal length 250-450 μm), well sclerotized, with expansive, ornamented dorsal, marginal-peritrematal, and ventrianal shielding. *Idiosomal dorsum* (Fig. 1). Idiosoma with two subequally sized dorsal shields, and with marginal-peritrematal shield on either side united with podonotal shield anteriorly and opisthonotal shield caudally. Podonotum holotrichous or slightly hypotrichous, with 19 to 22 pairs of setae, these idionymic, including 15 or 16 pairs (*j1-j6*, *z1*, *z2*, *z4-z6*, *s1*, *s2*, *s4*, *s6*, sometimes *z3*) on podonotal shield proper, and 4 to 6 pairs (*s3*, *s5*, *r3*, *r5*, sometimes *r2*, *r4*) on marginal shields extending from this shield ; podonotum lacking setae *r1*, *r6*, and sometimes apparently *z3*, *r2*, *r4* (or these at least indiscernible), and sometimes with *z1*, *z2*, *s3*, *r3*, *r5* minute, hardly discernible. Opisthonotum hypotrichous, with 12 to 17 pairs of setae, these idionymic, including only 7 or 8 pairs (*J1*, *J3-J5*, *Z2-Z4*, and sometimes paired or unpaired *J2*) on opisthonotal shield (*J5* and *Z4* inserted caudoventrally), and 5 to 9 pairs (*S3-S5*, *Z5*, *R1*, and sometimes *R2-R5*) on marginal shields (see also Figs. 3, 18) ; opisthonotum lacking setae *Z1*, *S1*, *S2*, *R5-R6*, and sometimes any or all of *R2-R4*. No setae inserted on lateral soft cuticle between dorsal and marginal or ventral shielding. Dorsal and lateral porelike structures include : 1 or 2 pairs of poroids (*idj1*, sometimes *idj4*) and 6 or 7 pairs of gland pores (*gdj2*, *gdj4*, *gdz5*, *gdz6*, *gds1*,

gds4, sometimes *gdr3* or medially unpaired *gdj6*) on podonotal shield; 4 pairs of poroids (*idJ2*, *idJ3*, *idJ5*, *idZ2*) and 5 to 8 pairs of gland pores (*gdJ3*, *gdJ4*, *gdJ5*, *gdZ2*, *gdZ3*, sometimes *gdZ1* or medially unpaired *gdJ1*, *gdJ2*) on opisthonotal shield; 3 pairs of poroids (*ids3*, *idS3*, *idR4*) and 5 pairs of gland pores (*gds3*, *gds5*, *gdR1*, *gdR2*, *gdZ4*) on marginal shields (*idR4* and *idS3* sometimes displaced onto edge of ventrianal shield). Gland pores *gds3*, *gds4*, *gdZ2*, *gdR1* single or multiple.

Idiosomal venter (Figs. 2, 5, 6, 14). Tritosternum (sternapophysis) slender, with elongate-trapezoidal base and sparsely pilose laciniae, these fused along most of their length. Presternal area unsclerotized, unornamented. Sternal setae *st1* inserted on separate jugular plates in both sexes, or these setae inserted together on tetartosternum in both sexes. Sternal lyrifissures *ist1-ist3* present or absent. Female with remainder of sternogenital shielding fragmented: setal pairs *st2* and *st3* inserted together on weakly sclerotized plate or each pair on separate such plate; setae *st4* inserted on soft cuticle laterad *st3*; sternogynial, or pseudosternal, shield not developed; sternovaginal, or vaginal, sclerites absent; latigynial shields weakly sclerotized, free from mesogynial shield, with one pair of "genital" setae, *st5*; mesogynial shield well sclerotized but moderately small, free from other shields. Male with remainder of sternogenital shielding variably sclerotized, sometimes fragmented, but entire if tetartosternum present; setae *st4* inserted posterolaterad *st3*, flanking anterior margin of genital orifice; genital orifice located at midlevel of coxae III, covered by single valve which lacks eugenital setae (Fig. 6); sternogenital shield with posterior margin fully united with ventrianal shield, and with "genital" setae *st5* inserted at level of posterior margins of coxae IV. Peritrematal shields continuously united dorsally with marginal shields and ventrally with exopodal shields bordering coxae II-IV. Peritremes extending only to level of anterior margins of coxae II; each peritreme with 1 or 2 glands near stigma. Porelike structures associated with peritrematal-exopodal shields include 4 pairs of poroids, and 1 pair of single or double gland pores in inguinal position. One or two pairs of ventral setae, *JV1* and sometimes *ZV1*, inserted in

small area of soft cuticle between mesogynial and ventrianal shields in female; *ZV1* absent, and *JV1* inserted on ventrianal shield in male. Ventrianal shield expansive, completely covering opisthogaster, fully coalesced with peritrematal-exopodal-metapodal shields anterolaterally, marginal shields laterally, and opisthonotal shield caudally. Ventrianal shield holotrichous, with 7 or 8 pairs of idionymic ventral setae (*JV2-JV5*, *ZV2-ZV4*, plus *JV1* on males and sometimes another pair inserted anterior to *ZV2* on females) and the para-anal setae, these inserted at level of anterior margin of anal opening; setae *Z5*, inserted laterad paranal setae, appear like another pair of ventral setae; shield with 1 pair of poroids laterad *ZV2*, and 1 pair of gland pores laterad paranal setae; euanal setae vestigial or absent; postanal seta and cribrum absent.

Gnathosoma (Figs. 3, 4, 8-10). Anterior margin of tectum denticulate; ventral face of tectum lacking a median keel. Subcheliceral plate (epistome) with short, clavate or spatulate, pilose supralabral process arising from its dorsoproximal surface, this flanked by pair of small, apparently paralabral processes (Fig. 4) which is indiscernible in some preparations. Subcheliceral plate lacking median (epistomal) apodeme. Chelicerae with well developed fixed and movable chelae; dorsal cheliceral seta present at base of fixed chela; movable chela with single brushy excrescence arising from proximoventral surface (Fig. 10). Subcapitulum with 4 pairs of simple setae. Anterior extremity of hypostome with pair of corniculi arising from its dorsal wall, and with pair of internal malae and pair of more lateral hypostomatic processes, resembling "paralaciniae" as found in some uropodoid mites, arising from its ventral wall (Fig. 8); salivary stylets absent. Palpal segmentation normal, tibia not coalesced with tarsus; palptarsal apotele 3-tined; palpal chaetotactic formula, sensu EVANS (1964), 2-5-6-12-16, with palptibia retaining larval-protonymphal complement of setae.

Legs (Figs. 11-13). Tarsus I with paired claws present or absent; tarsi II to IV with pretarsi bearing paired claws and median pulvillus. Tarsi II and III with 19 setae, including *al-4* (*al-x* of EVANS 1965), and *ad-1* and *pd-1* apically which resemble

short seta-like processes ; ventral sclerite in circumsegmental fissure lacking setae on these tarsi. Tarsus IV with 21 setae, including same setation as on tarsi II-III plus 2 setae, *av-4* and *pv-4*, on ventral sclerite in circumsegmental fissure (Fig. 13). Setation of coxae of legs I-II-III-IV, respectively, 2-2-2-1 ; that of trochanters, 6-5-5-5 ; coxa IV with alveolar vestige of second seta, *av* (Fig. 11) ; femur II with 2 setae, *al-2* and *pv-1*, on basifemoral section. Chaetotactic formulae for femoral, genual, tibial setae of legs I-II-III-IV, respectively : femora I (2-2/2,2/2-2), II (2-2/1,2/2-1), III (1-2/1,2/1-0), IV (1-2/1,2/1-1) ; genua I (2-3/1,2/1-2), II (2-3/1,2/1-2), III (2-3/1,3/0-2), IV (2-3/1,3/0-1) ; tibiae I (2-3/2,2/2-1), II (2-2/1,2/1-2), III (2-2/1,2/1-2), IV (2-2/2,2/1-1). Leg I lacking setae *ad-3* and *pv-3* on femur, *pd-3* on genu, *pd-3* and *pl-2* on tibia ; leg II lacking seta *pd-3* on genu ; leg III lacking setae *al-2* and *pl-1* on femur, *pv-1* on genu ; leg IV (Fig. 11) lacking setae *pd-3*, *al-2* and *pl-2* on femur, *pv-1* and *pl-2* on genu, *pl-2* on tibia

Deutonymphal and protonymphal characteristics not available for family level, as these instars available for only one genus (see below).

Distribution and habitats. We have examined specimens of this family from a variety of types of forest litter in Middle America, from southern Mexico to Colombia, as follows :

Pyrosejus prionotus, n.gen., n.sp., in species-group 1, from oak litter, elevation ca. 2000 m, and mixed broadleaf litter, elev. ca. 2100 m, Est. Chiapas, Mexico, and from cloud forest leaf litter, 2200 m, Dep. Zacapa, and rainforest litter, elev. 150-400 m, Dep. Izabal, Guatemala.

Pyrosejus sp. 2 in species-group 1, from mixed pine, fern, broadleaf litter, elev. 2000 m, and cloud forest leaf litter, 2200 m, Dep. Zacapa, Guatemala.

Pyrosejus sp. 3 in species-group 1, from decaying wood, base of large surá tree, elev. 150 m, Prov. Heredia, Costa Rica.

Pyrosejus spp. 4 and 5 in species-group 1, from rainforest litter, elev. 150 m, Prov. Heredia, Costa Rica.

Pyrosejus sp. 6 in species-group 1, from forest litter, elev. ca. 2600 m, Dist. Bogotá, Colombia.

Pyrosejus sp. 7 in species-group 2, from mixed pine, oak litter and mixed pine, fern, broadleaf litter, elev. 1800-2000 m, Dep. Zacapa, and mixed pine, oak, liquidambar litter, elev. 1500 m, Dep. Baja Verapaz, Guatemala.

Pyrosejus sp. 8 in species-group 2, from moss beneath tree fern, rainforest, elev. 600 m, Dep. Izabal, Guatemala.

Pyrosejus sp. 9 in species-group 2, from fern litter, and moss on large tree limbs, cloud forest, elev. 2200 m, Dep. Zacapa, and from moss beneath tree fern, rainforest, elev. 600 m, Dep. Izabal, Guatemala.

Genus 2, sp. 1, from rainforest litter, elev. 150-200 m, and deep rainforest litter, base of large tree, elev. 400 m, Dep. Izabal, Guatemala.

Based on even these limited data, it appears on one hand that two species of Pyrosejidae sometimes coexist in certain substrates. For examples, some specimens of *P. prionotus* and *genus 2*, sp. 1 were collected together from lowland rainforest litter in Guatemala ; some of *Pyrosejus* spp. 8 and 9 were collected together from moss beneath a tree fern, from another lowland rainforest habitat in Guatemala ; and some of *Pyrosejus* spp. 4 and 5 were collected together from lowland rainforest litter in Costa Rica. On the other hand, collection data associated with specimens of *P. prionotus* indicate that a given species may occur in various kinds of forests under different climatic regimes and altitudes.

Etymology. The name of the family and genus is a combination of the Latin words “pyrus”, meaning pear, and “sejus”, a Roman surname used by many authors to form names for genera of mesostigmatic mites. The name is masculine in gender, and is intended to refer to the pear-shaped body of these mites.

Remarks. The entire supercohort Trigynaspida has not been the subject of any adequate cladistic analysis, and its component families have generally not been defined apomorphically. No analysis of many of the characters used in description of taxa

of Trignyaspida, in order to hypothesize character state polarities, has as yet been published. As this task is far beyond the scope of our study, the following remarks generally are not presented in a cladistic context.

Adults of Pyrosejidae are characterized by several attributes that appear to be unique to it among the described families of the cohort Cercomegistina : a pair of marginal shields flank the dorsal shields from anterior to posterior extremities of the idiosoma, much as found among some taxa of Uropodina ; the ventrianal shield fully coalesces with the peritrematal-exopodal-metapodal shielding anterolaterally, the marginal shields laterally, and the opisthonotal shield posteriorly ; the subcapitulum has a pair of "paralaciniae" laterad the internal malae ; coxa IV retains the alveolar vestige of a second seta, as also is found occasionally in Antennophorina (*e.g.*, the hoplomegistid genus *Stenosternum*, personal observation, E.E.L.) ; femur IV retains a seta which we denote as *av-1* (see discussion) ; femur I lacks seta *pv-3* ; and femur IV lacks seta *al-2*. These two setal losses on femur I and femur IV are unique to Pyrosejidae in the Cercomegistina, though the former is found among some, and the latter among all, members of Antennophorina as indicated by KETHLEY (1977).

Adults of this family are also characterized by a combination of other characteristics that is not found among the previously described families of Cercomegistina : the idiosoma has two, separate, dorsal shields, neither of which is hypertrichous (the podonotal one is holotrichous or somewhat hypotrichous, the opisthonotal one is markedly hypotrichous) ; a pair of well developed jugular plates or a tetartosternum bear sternal setae *st1*, but the remainder of the sternal shield is fragmented in the female, though sometimes intact in the male ; the latigynial and mesogynial shields are present as separate elements in the female ; only 5 pairs of sternogenital setae (including only 1 pair on the latigynial shields of the female) are present in both sexes ; the ventrianal shield is holotrichous and lacks an unpaired postanal seta ; and the subcapitular setae are smooth.

Adults of Pyrosejidae have a reticulum of mor-

phological similarities with other families in Cercomegistina. Based on leg chaetotactic data among the families of Trignyaspida as presented by KETHLEY (1977), some of the setal losses found in Pyrosejidae are shared with some of the families of Cercomegistina to the exclusion of others : the losses of *pd-3* from genera I-II and *pv-1* from genera III-IV are shared with the cercomegistine families excluding Cercomegistidae ; the loss of *pl-2* on genu IV is shared with the cercomegistine families excluding Seiodidae ; the loss of *al-2* on femur III is shared exclusively with Seiodidae ; and the loss of *pl-2* on tibia I is possibly shared with Asternoseiidae (if KETHLEY's undescribed genus numbered 69-77 is of that family — see discussion), to the exclusion of the other described families.

Apart from leg chaetotaxy, adult Pyrosejidae resemble those of Asternoseiidae in lacking hypertrichy and having a similar complement of setae on the idiosoma, and in having a fragmented sternal shield and separate latigynial and mesogynial plates in the female. They resemble those of Seiodidae in having the ventrianal shield fused caudally with a dorsal shield, and in lacking a postanal seta. They are similar to members of both of these families in having smooth subcapitular setae, and in having all marginal setae inserted on shielding. The absence of marginal setae on soft cuticle in adult Asternoseiidae and Seiodidae contrasts with the condition found in Cercomegistidae and Davacaridae. We conclude that adult asternoseiids and seiodids have marginal shields, as in the new family, but that these shields are consolidated with the dorsal shields, which are further consolidated into a single shield, in contrast to the new family.

Deutonymphs of Pyrosejidae resemble those of Davacaridae, as described by HUNTER (1970), in having a pair of mesonotal plates that bear several *J* and *Z* setae in the opisthonotal region ; this appears to be a derived, delayed or neotenuous condition, which is usually expressed in protonymphs, though not in these two families. However, davacarids differ from pyrosejids in having a well defined pygidial shield also on the deutonymph and in retaining these separate mesonotal plates and pygidial shield into adulthood.

Pyrosejus new genus

Figs. 1-20

TYPE SPECIES : *Pyrosejus prionotus* new species. Genus based on adult female and male, deutonymphal, and protonymphal material representing 9 species (8 undescribed) in 2 species groups, in distinction to the adult female and male of another undescribed species considered to represent another, undescribed, genus.

Diagnosis. Adults of *Pyrosejus* differ from those of another, as yet undescribed, genus of Pyrosejidae in having : the podonotum holotrichous, with 22 pairs of readily discernible setae, including 16 pairs on the podonotal shield (*z3* present) and 6 pairs on the anterior part of the marginal shields (*r2* and *r4* present); the opisthonotum with 14 to 17 pairs of setae, including 7 or 8 pairs on the opisthonotal shield (*J2* absent or paired when present) and 7 to 9 pairs on the posterior part of the marginal shields (*R3*, and sometimes *R2* or *R4* present); sternal setae *st1* inserted separately on well developed jugular plates on both sexes; the ventrianal shield with a thickened ridge delineating line of union with marginal shields on either side; reticulate ornamentation over some or all surfaces of the dorsal and ventrianal shields; tarsus I with well developed, paired claws; and tibia I with seta *ad-2* not modified as a macroseta.

In contrast, adults of the undescribed genus (based on but one species) have : the podonotum slightly hypotrichous, with 19 pairs of setae, including 15 pairs on the podonotal shield (*z3* absent) and 4 pairs on the anterior part of the marginal shields (*r2* and *r4* absent), and of these setae, *z1* and *z2* on the podonotal shield and *s3*, *r3* and *r5* on the marginal shields minute, hardly discernible; the opisthonotum with 12 pairs of setae, including 7 pairs plus an unpaired seta *J2* medially on the opisthonotum and only 5 pairs on the posterior part of the marginal shields (*R2-R5* absent); sternal setae *st1* inserted together on a well developed tetartosternum which is separate from other sternal shielding in the female but is contiguous with the

rest of the sternogenital shield in the male; the ventrianal shield without a well defined ridge delineating its union with the marginal shields on either side; foveate ornamentation, as well as reticula, over some or all surfaces of the dorsal and ventrianal shields; tarsus I lacking claws; and tibia I with seta *ad-2* modified as a macroseta.

Description. Adults with character states of family Pyrosejidae as described above, but restricted and augmented as follows :

Idiosomal dorsum (Fig. 1). Marginal shields uniting anteriorly with podonotal shield at level varying from between setae *s3* and *s4* to between *r3* and *s2*; posterior margin of podonotal shield overlapping anterior margin of opisthonotal shield; opisthonotal shield broadly rounded and semicircular posteriorly, broadly united caudally with marginal shields and ventrianal shield; dorsal shields reticulated over some or all of surface. Podonotum holotrichous, with 22 pairs of setae, including 16 pairs (*j1-j6*, *z1-z6*, *s1*, *s2*, *s4*, *s6*) on podonotal shield proper, and 6 pairs (*s3*, *s5*, *r2-r5*) on marginal shields extending from this shield. Opisthonotum hypotrichous, with 14 to 17 pairs of setae, including 7 or 8 pairs (*J1*, *J3-J5*, *Z2-Z4*, sometimes *J2*) on opisthonotal shield, and 7 to 9 pairs (*S3-S5*, *Z5*, *R1*, *R3*, *R5*, sometimes *R2*, *R4*) on marginal shields (see also Figs. 2, 19). All dorsal and marginal shield setae readily discernible, smooth or slightly barbed, tapered, sometimes inserted on tubercles. Poroids *idj4* and gland pores *gds1* and unpaired *gdj6* present or absent on podonotal shield, *gdZ1* present or absent on opisthonotal shield; gland pores *gds3*, *gds4*, *gdZ2*, *gdR1* single or multiple; poroids *idS3* and *idR4* located either on marginal shields, laterad ridge delineating these shields from ventrianal shield, or on edge of ventrianal shield, mediad this ridge.

Idiosomal venter (Figs. 2, 14). Sternal setae *st1* inserted on well developed jugular plates in both sexes. Some or all of sternal lyrifissures *ist1-ist3* absent, *ist1-ist3* sometimes present on male though

absent on female. Mesogynial shield of female longer than wide, not widened posteriorly, free from other shields though its posterior margin sometimes touching anterior margin of ventrianal shield; pair of glandular pores present or absent in genital region between bases of coxae III and IV. Peritrematal shielding reticulated, and with a prominent dorsoventral ridge at level of posterior margin of coxae III, extending dorsally to level of setae *r5*. Peritrematal-exopodal shielding with no sutures delineating their lines of union with ventrianal shield. Setae *ZVI* absent or present beside *JVI* on small area of soft cuticle between mesogynial and ventrianal shields in female; *ZVI* absent and *JVI* inserted on ventrianal shield in male. Ventrianal shield reticulated over entire surface, continuously united with similarly reticulated marginal shields laterally, with thickened ridge delineating their line of union on either side; anterior margin of ventrianal shield entire or incised medially on female, entire on male.

Gnathosoma (Figs. 3, 4, 8-10). Anterior margin of tectum convexly rounded or subtriangular, coarsely denticulate. Fixed digit of chelicera with minute pilus dentilis and row of several teeth; movable chela also with row of several teeth; membrane enveloping base of movable chela not fimbriated; above base of movable chela, hyaline groove on paraxial face of fixed chela simple. Subcapitulum with second pair of setae inserted well anterior level of third pair, and not aligned transversely or longitudinally with first or third pair; elements of second pair more widely spaced from each other than are elements of first or third pairs. Corniculi simple; internal malae finely pilose, slender, acuminate; "paralaciniae" sparsely barbed apically. Palpal chaetotaxy as stated for family; palptibia retaining basic larval complement of setae.

Legs (Figs. 11-13). Tarsus I with paired claws sessile, well developed, their shanks evenly curved or nearly straight and curved only at apices; acrotarsal suture effaced ventrally; dorsal acrotarsal cluster of sensillae in a depression; lanceolate-tipped sensilla elongate. Pretarsi of legs II-IV with well developed claws, acuminate laterodistal elements (paradactyli), and round-lobed pulvilli. Leg

chaetotactic formulae as stated for family; tibia I with seta *ad-2* not modified as a macroseta.

Deutonymphs of this genus, based on material representing two species (one of which is undescribed), are generally characterized as follows.

Idiosomal dorsum (Fig. 15). Podonotal chaetotaxy and porotaxy as in adult except gland pores *gds3* simple, and *gds4* simple or double and enlarged, rather than multiple. Podonotal shield weakly sclerotized, with 8 or 9 pairs of setae (*j2-j6*, *z4-z6*, and *s4* on or off shield); *j2*, *z4*, *z6*, and sometimes *s4* on weakly defined margins of shield; medial unpaired gland pore *gdj6* present or absent, as in adult. Setae *j1*, *z1-z3*, *s1-s3*, *s5*, *s6*, *r2-r5* inserted peripherally on apparently soft cuticle which unstriated and partly or mostly ornamented faintly with reticula of microtubercles or microspicules; striated cuticle evident only as transverse strip between setae *j6* and *J1* laterad to level of setae *s6*. Opisthonotal chaetotaxy and porotaxy as in adult except gland pores *gdZ2* simple or double rather than multiple; medial unpaired gland pores *gdJ1* and *gdJ2* present or absent, as in adult. Opisthonotum with pair of weakly sclerotized, well separated mesonotal plates bearing setae *Z2*, *J2* if present, and sometimes *J1*. Soft opisthonotal cuticle partly or mostly ornamented faintly as on podonotum.

Idiosomal venter (Fig. 16). Tritosternum and podosomal chaetotaxy and porotaxy as in adult except gland pore *gv2* single rather than double. Sternogenital shield entire, weakly sclerotized, unornamented, its margins hardly discernible, with endopodal extensions between bases of legs I and II, II and III, III and IV; shield with 4 or 5 pairs of setae including *st1-st4*; *st4* inserted at level of anterior margins of coxae IV (rather than level of anterior margins of coxae III as in adult); *st5* inserted on or off this shield, at level of posterior margins of coxae IV (as in adult male, rather than at level of posterior margins of coxae III as in adult female). Peritrematal shields weakly sclerotized, unornamented, extending anteriorly as bands to vertical region anterior setae *j1* where their delineation becomes indiscernible, and posteriorly around base of leg IV nearly to pores *gv2*. Large, weakly sclerotized, faintly reticulated lateropeltidial shields discernible in metapodal region; these border peri-

trematal shields dorsoanteriorly as far as anterior extent of peritreme, about to level between bases of legs II and III; their posterior expansions sometimes bear insertions of setae *ZV1* and *ZV3*. Opisthogastric surface otherwise apparently unsclerotized, though its soft cuticle sometimes faintly ornamented with reticula of microtubercles or microspicules as on dorsum; slight indication of smooth, subcircular anal plate evident on one specimen; striated cuticle evident only as transverse strip between setae *st5* and *JV2* laterad to pores *gv2* behind bases of legs IV. Opisthogastric chaetotaxy and porotaxy as in adult except setae *ZV1* consistently absent.

Gnathosoma and Legs. As described for adult.

Etymology. See under description of family.

Remarks. We have two deutonymphal specimens of the type species, described below, and a protonymphal specimen of a second species and three deutonymphal specimens of a third species of this genus, which remain undescribed. Study of these specimens enabled us to confirm not only that there is no hypertrichy in these instars, but that the general pattern of ontogeny of idiosomal setae is similar to that in the Monogynaspida. The protonymph has the following complement of idiosomal setae (Figs. 17, 18):

Podonotum : *j1-j6* ; *z2, z4, z5* ; *s4-s6* ; *r2, r3, r5*.

Opisthonotum : *J1, J3-J5* ; *Z3-Z5* ; *S3-S5* ; *R1*.

Podosomal venter : *st1-st3*.

Opisthosomal venter : *JV1, JV2, JV5* (*ZV2* absent).

The following setae are added on the deutonymphal instar (Figs. 15, 16):

Podonotum : *z1, z3, z6* ; *s1-s3* ; *r4*.

Opisthonotum : *Z2* ; *R3*, sometimes *R2, R4*.

Podosomal venter : *st4, st5*.

Opisthosomal venter : *JV3, JV4* ; *ZV2, ZV3, ZV4*.

First expression of setae *J2* is uncertain, as we do not have immature instars earlier than the deutonymph for species in which these setae are present.

Setae *st5, Z2*, and *ZV2* usually first appear in the protonymph, at least in the cohort Gamasina of the Monogynaspida. The apparent delay in appearance of two opisthosomal setae, *Z2* and *ZV2*, in the Pyrosejidae may be correlated with the trend toward hypotrachy that is restricted primarily to this region in the family. However, absence of *J1* and *Z1* in the protonymph has also been interpreted by notation to occur in the antennophorine genus *Celaenopsis*, which otherwise manifests peripheral hypertrichy, primarily among the *r-R* series, in the protonymph (HIRSCHMANN 1957). Based on the few illustrations by various authors (e.g., EVANS 1958; KINN 1966, 1967, 1968) of other known immature instars of genera in both the Antennophorina and Cercozegistina, one can not ascertain whether *J1* and *Z1* remain absent among the peripheral or general hypertrichy that usually commences already in the protonymph, though they are clearly absent among the holotrichous set present in the larva, as is the case in the Gamasina (HIRSCHMANN 1957).

Based on material at hand representing several undescribed species, we recognize two species groups in this genus. These are distinguished informally in the remarks following description of the type species.

Pyrosejus prionotus sp. nov.

Figs. 1-16

Diagnosis. Adults of this species are similar to those of a second, as yet undescribed species, in contrast to those at hand of six other undescribed species of this genus, in lacking an unpaired gland pore medially between setae *j6* on the podonotal shield, in having setae *J2* present on the opisthonotal shield, in lacking the pair of sternal lyrifissures *ist3*, and in the males' having the first two pairs of sternal setae distinctively thickened. They differ from those of the second species in the podonotal shield lacking conspicuous, paired longitudinal fields of tubercles anterolaterally between setae *j1-j3* and *z1-z3*, in the opisthonotal shield being continuously reticulate over its central surface, and in the female's mesogynial shield being

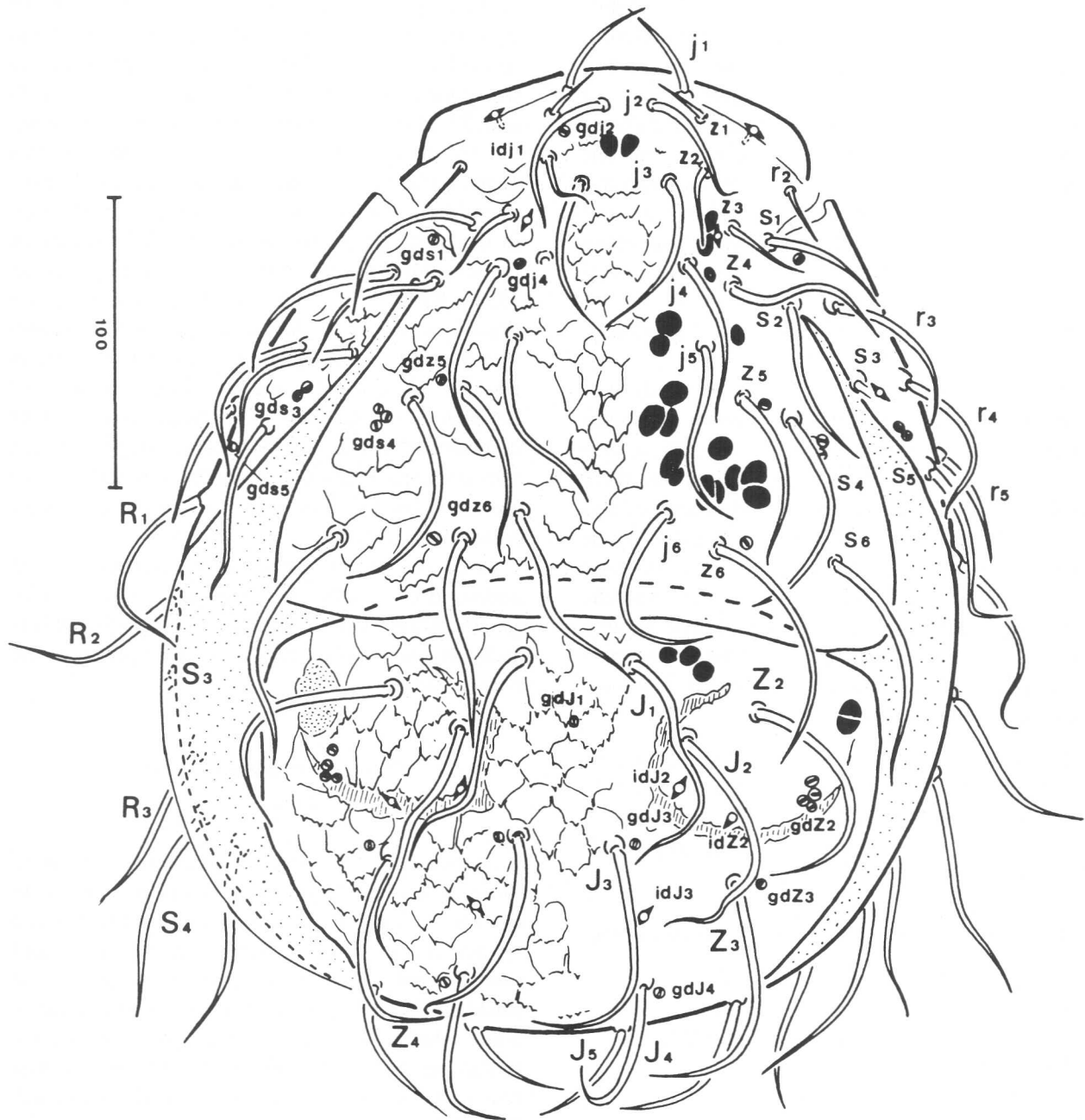


FIG. 1 : *Pyrosejus prionotus* n. gen., n. sp., adult female, body dorsum with complete notation for setae and porelike structures.

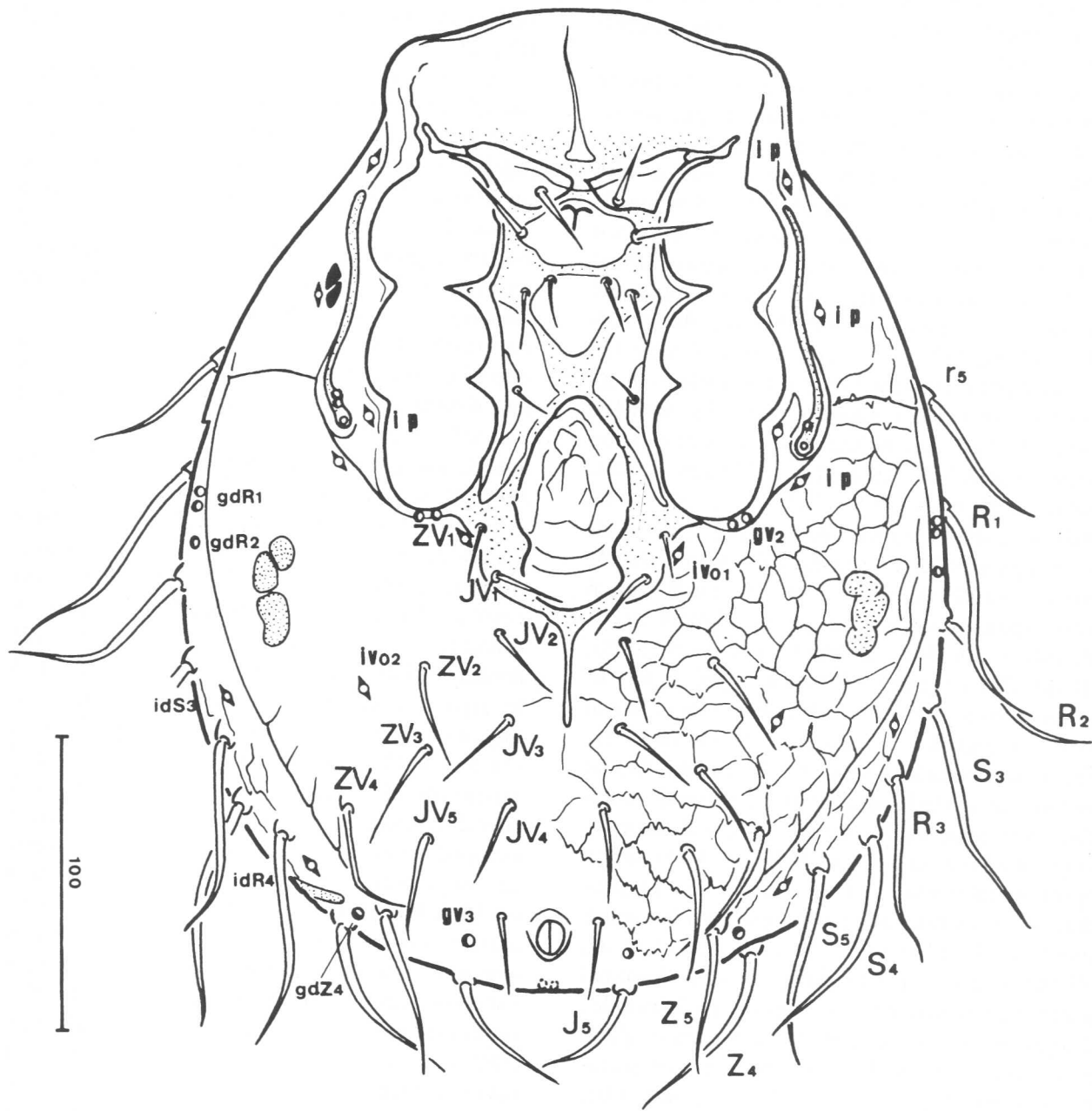


Fig. 2. — *Pyrosejus prionotus* n. gen., n. sp., adult female, body venter, with notation for peritrematal and opisthogastric setae and porelike structures.

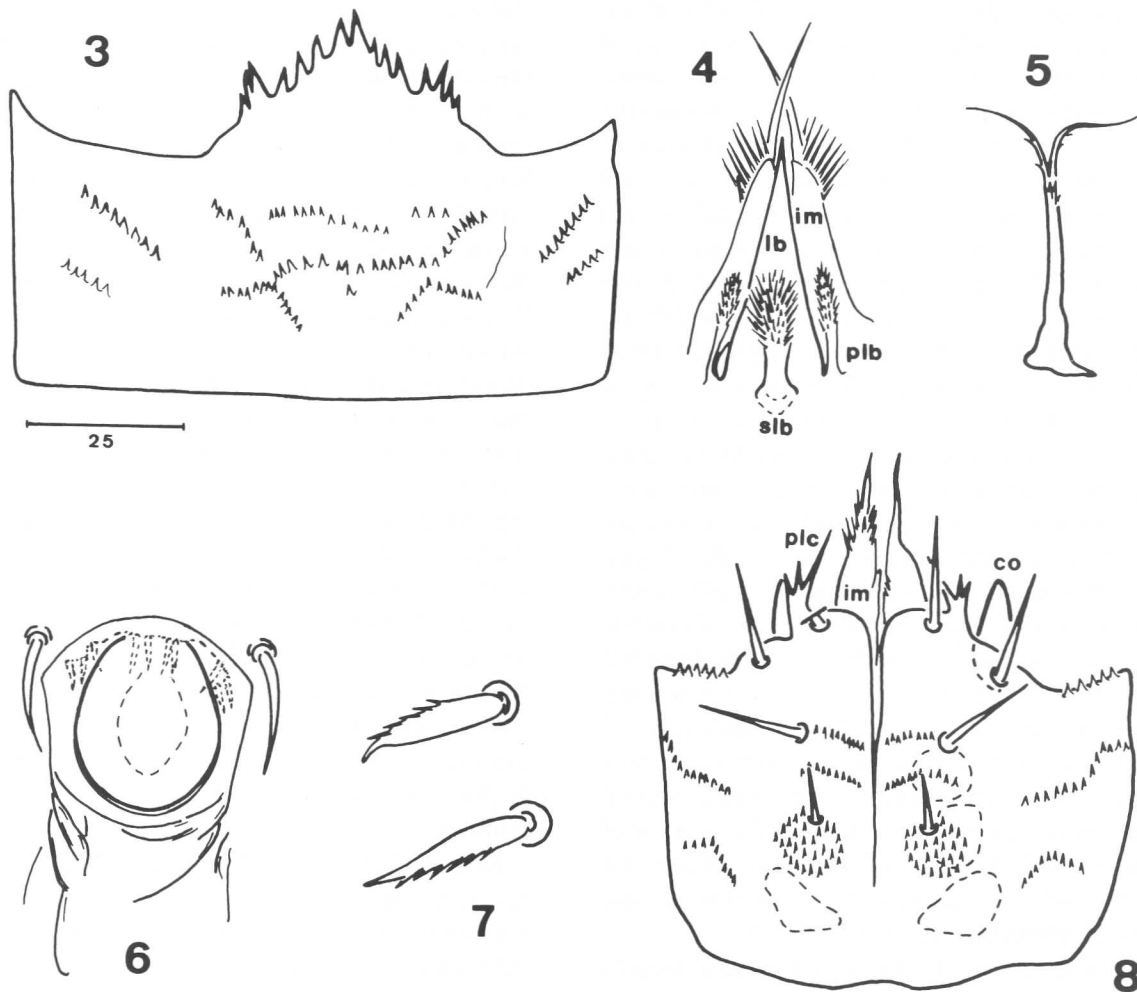
not more than twice as long as wide (rather than nearly thrice as long as wide in the second species).

Description. With character states of genus *Pyrosejus* as described above, but restricted and augmented as follows :

ADULT FEMALE. *Idiosomal dorsum* (Fig. 1). Dorsal shields together 270-360 μm long (11 specimens); podonotal shield 156-202 μm long, 185-232 μm wide at level of setae *z6*, broadly united with extensions of marginal-peritrematal shields anterolaterally at level of setae *s2* and *r3*; posterior margin of podonotal shield overlapping about 10-20 μm of anterior margin of opisthonotal shield in undistorted specimens; opisthonotal shield 124-168 μm long, 193-232 μm wide at level of setae *J2*; dorsal shields reticulated over entire surface, many to nearly all reticula jagged, outlined by denticles, some of these resembling tubercles caudally on posterior shield. Podonotum with 22 pairs of setae, including 16 pairs (*j1-j6*, *z1-z6*, *s1*, *s2*, *s4*, *s6*) on podonotal shield proper, and 6 pairs (*s3*, *s5*, *r2-r5*) on marginal shields extending from this shield; podonotum lacking setae *r1* and *r6*. Opisthonotum with 16 pairs of setae, including only 8 pairs (*J1-J5*, *Z2-Z4*) on opisthonotal shield, and 8 pairs (*S3-S5*, *R1-R4*, *Z5*) on marginal shields; only 1 pair of marginal setae, *R4*, inserted between bases of lateral setae *S4* and *S5* on marginal shields (Fig. 2); opisthonotum lacking setae *Z1*, *S1*, *S2*, *R5*. Dorsal and marginal shield setae inserted on small tubercles; most setae slightly stout, curved and relatively long (50-85 μm on podonotal shield, 75-100 μm on opisthonotal shield), about 1.5 longer than longitudinal intervals between their bases, but a few much smaller (*j1* 35, *z1* and *j3* 18, *z2* and *z3* 28, *r2* 23, *J5*, *Z5* and *S5* 37-48 μm). Dorsal and lateral idiosomal porelike structures, positioned as in Fig. 1, include: 2 pairs of poroids (*idj1*, *idj4*) and 6 pairs of gland pores (*gdj2*, *gdj4*, *gdz5*, *gdz6*, *gds1*, *gds4*) on podonotal shield; 5 pairs of poroids (*idJ2*, *idJ3*, *idJ5*, *idZ2*, *idS3*), 5 pairs of gland pores (*gdJ3*, *gdJ4*, *gdJ5*, *gdZ2*, *gdZ3*) and 1 unpaired medial gland pore (*gdJ1*) on opisthonotal shield; 2 pairs of poroids (*idS3*, *idR4*) and 5 pairs of gland pores (*gds3*, *gds5*, *gdR1*, *gdR2*, *gdZ4*) on marginal shields. Unpaired gland pores *gdj6*, *gdJ2* absent medially. Gland pores *gds4* tripled on podonotal shield, *gds3*

and *gdR1* doubled on marginal shields, and *gdZ2* quadrupled on opisthonotal shield. Poroids *idS3* and *idR4* located on marginal shields, laterad ridge delineating these shields from ventrianal shield (Fig. 2).

Idiosomal venter (Figs. 2, 5). Tritosternum (sternapophysis) with laciniae fused along nearly 0.7 of length. Sternal setae *st1* inserted on well developed jugular plates, these continuous on either side anterolaterally with endopodal strips between coxae I and II. Sternal shielding fragmented; setae *st2* isolated together on weakly sclerotized plate with an irregular I- or Y-shaped subsurface thickening medially; setae *st3* isolated together on a barely discernible plate behind *st2*, and setae *st4* inserted on soft cuticle laterad of *st3*; *st1* and *st2* (length 28 μm) slightly stouter and about 1.5 longer than *st3* and *st4* (17 μm). All sternal lyrifissures, *ist1-ist3*, absent. Latigynial shields weakly sclerotized, free from mesogynial shield, with one pair of "genital" setae, *st5* (15 μm). Mesogynial shield 1.7-2.0 longer than wide, well sclerotized, irregularly reticulated, free from other shields, with lateral margins constricted posteriorly, posterior margin convexly rounded or subtriangular; anterior half of shield flanked by latigynial shields, posterior half flanked by expansive opisthogastric shield. Endopodal plating present as a pair of continuous strips flanking coxae II to IV, these united anteriorly with lateral extremities of jugular plates and posteriorly with lateral margins of latigynial shields; posterior endopodal extremities approaching those of exopodal strips near position of gland pores *gv2*, these doubled. Peritremes extending to midlevels, or to anterior margins, of coxae II. Porelike structures associated with peritrematal-exopodal shields include 4 pairs of poroids and 1 pair of gland pores, positioned as in Fig. 2. Two pairs of ventral setae, *ZV1* and *JV1*, inserted on narrow strip of soft cuticle between mesogynial and ventrianal shields. Ventrianal shield with anterior margin deeply incised medially to level varying from setae *JV3* to *JV4*; shield reticulated over entire surface, with most reticula in ventromedial area jagged with denticles or tubercles. Ventrianal shield with 7 pairs of ventral setae (*JV2-JV5*, *ZV2-ZV4* and sometimes an additional seta inserted asymmetrically anterior



FIGS. 3-8 : *Pyrosejus prionotus* n. gen. et sp., adult.

3. — Tectum, dorsal aspect. 4. — Circum-oral processes. 5. — Tritosternum. 6. — Male genital opening and setae *st* 1 and *st* 2, enlarged view. 7. — Male sternal setae *st* 1 and *st* 2, enlarged view. 8. — Subcapitulum, ventral aspect. Abbreviations : *co* , corniculus ; *im* , internal mala (lacinia) ; *lb* , labrum ; *plb* , paralabrum ; *plc* , paralacinia ; *slb* , supralabrum.

to *ZV2*) plus the para-anal setae ; setae *Z5* appear like an 8th pair of ventral setae laterad of paranals ; all setae inserted on small tubercles ; setal lengths, *JV1* and *ZV1* 17-22, *JV2-JV4* 27-32, *JV5* and *ZV2-ZV4* 34-41, para-anals 23 μ m ; shield with 1 pair of poroids, *ivo2*, and 1 pair of gland pores, *gv3*, positioned as in Fig.2.

Gnathosoma (Figs. 3, 4, 8-10). Anterior margin of tectum subtriangular, coarsely denticulate ; dorsal face of tectum with 2 oblique rows of denticles above palpcoxal bases laterally and with several

irregular rows of such denticles centrally (Fig. 3). Subcheliceral plate with short (13 μ m), clavate, pilose, supralabral process arising from its dorso-proximal surface (Fig. 4). Fixed digit of chelicera with minute pilus dentilis and row of 6 or 7 similarly sized teeth of which 3 or 4 more proximal teeth separated from 3 more distal teeth by interval equivalent to 1 tooth (Fig. 10) ; movable chela with row of 7 or 8 evenly spaced teeth of similar size except most proximal tooth larger, and with proximoventral excrescence extending slightly beyond

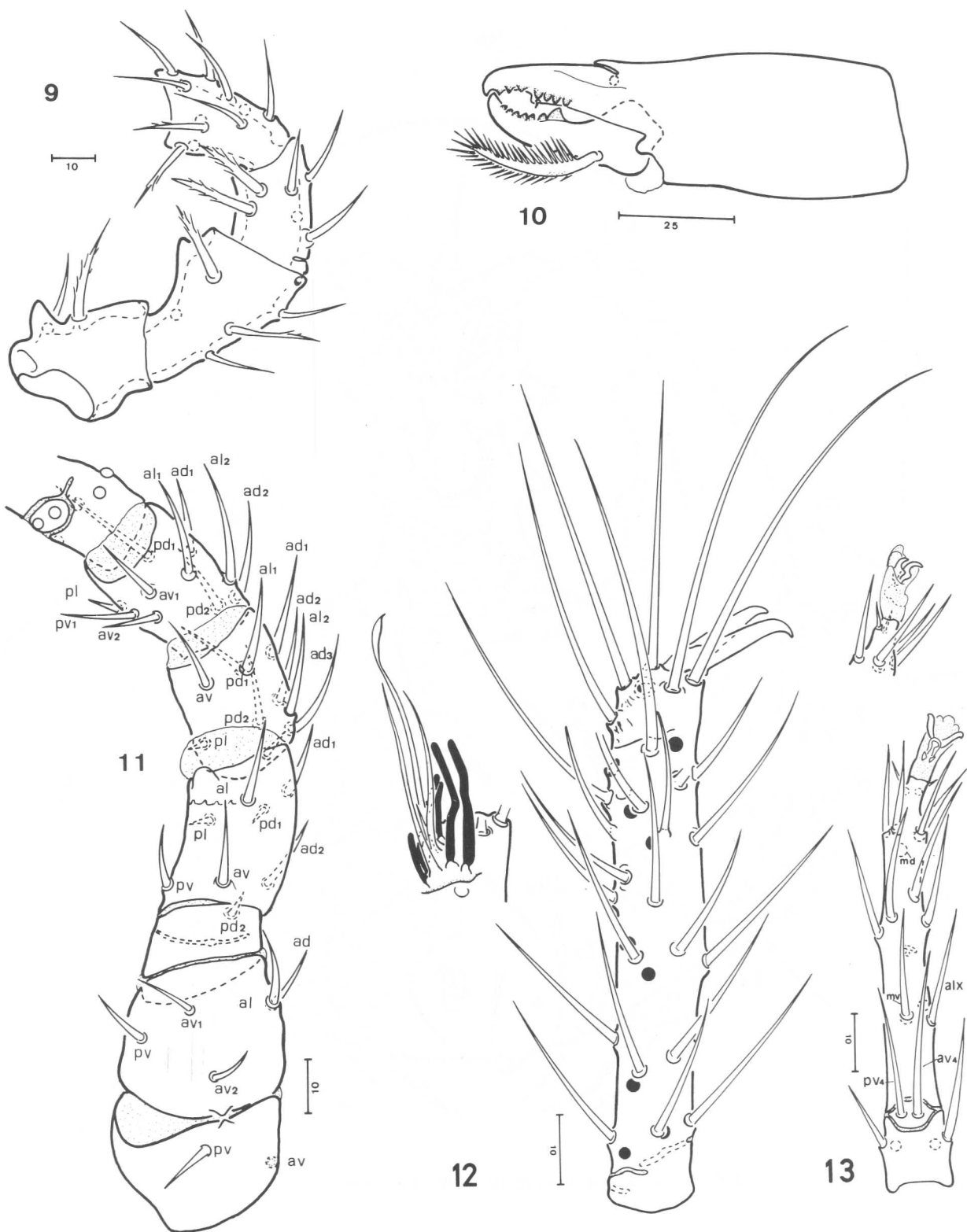
apex of chela; dorsal cheliceral seta acuminate. Subcapitulum with 3 lateral rows of denticles on either side, of which most anterior row on rim of trochanteral articulation, and middle row continuing onto dorsolateral surfaces of gnathosomatic base (Fig. 8); subcapitulum with a round patch of fine denticles at base of each capitular seta, and with 2 transverse rows of denticles extending from deutosternum between subcapitular setae 3 and capitular setae; deutosternal (hypognathal) groove linear, with scarcely any measurable width (2-3 μm). Subcapitular pairs of setae simple, similar in length (about 15 μm) and about twice as long as capitular setae (7 μm); corniculi short (17 μm); internal malae projecting over twice as far anteriorly as other distal hypostomatic processes; "paralaciniae" with 3 or 4 apical barbs, medial-most barb longest. Palpal length (90-95 μm) 1.8 times greater than subcapitular length (about 50 μm , measured from its base to bases of anterior subcapitular setae); palpal chaetotaxy as described for family; palptrochanter with seta *v-2* barbed, thicker and longer (57 μm) than simple seta *v-1* (40 μm), and with blunt ventral protuberance near base of *v-1* (Fig. 9); palpfemur with similar ventral protuberance subapically near base of seta *al*; *al* of palpfemur and *al-1*, *al-2* of palpgenu stouter and more strongly barbed than other palpal setae, and somewhat thickened, spatulate distally.

Legs (Figs. 12-13). Excluding ambulacra, lengths of leg I (220-290 μm) and leg IV (255-315 μm) each slightly less than collective length of the two dorsal shields. Length ratios, tarsus : tibia : genu on leg I, about 2.0 : 1.0 : 1.0. Coxa I with 4 gland pores ventroproximally; coxae II-III with denticular ridge behind posterior coxal seta and with distal margin denticulate behind condyle; coxa IV with alveolar vestige of second seta, *av* (as in Fig. 11). Femora II-III with a file of denticles or tubercles along ventral surface, which intersects a transverse row of such denticles leading from base of seta *al*. Tarsus I with paired claws well developed (length 15 μm), with nearly straight shanks curved only at apices (Fig. 12); tarsus I with 46 setae, including 5 anterolaterals, 5 posterolaterals, 9 ventrals, and 27 other setae and sensillae dorsally and apically; configuration of dorsal acrotarsal cluster of sensil-

lae as shown in Fig. 12; lanceolate-tipped sensilla *s* elongate (33 μm). Tarsi II to IV with apical setal processes *ad-1* and *pd-1* short (5-6 μm), and with pretarsi moderately short (6-7 μm), their paired claws moderately long (10 μm); claws each with a ventral thickening along basal halves (Fig. 13). Setation of trochanters of legs I-II-III-IV, respectively, 6-5-5-5; that of femora, 12-10-7-8; that of genua, 11-11-11-10; that of tibiae, 12-10-10-10; leg chaetotactic formulae normal for genus and family Pyroseejidae as presented above. Leg setae smooth, simple; tarsus I with about 12 of its dorsal and lateral setae moderately elongated (35-55 μm) subapically; none of setae elsewhere on leg I and on legs II-IV elongated or enlarged as macrosetae.

ADULT MALE. *Idiosomal dorsum*. Dorsal shields together 288-344 μm long (5 specimens); podonotal shield 163-195 μm long, 171-222 μm wide at level of setae *z6*, united with marginal-peritrematal shields and overlapping opisthonotal shield as in adult female; opisthonotal shield 129-161 μm long, 185-222 μm wide at level of setae *Z1*, shaped and united with marginal and ventrianal shields caudally as in adult female. Ornamentation, setation, complement of porelike structures, and multiplicity of certain gland pores as in adult female.

Idiosomal venter (Fig. 14). Tritosternum, presteranal area, and jugular plates as in adult female. Remainder of sternogenital shield variably sclerotized; setae *st2* inserted together on slightly more weakly sclerotized area having indistinct anterior margin; setae *st4* inserted posterolaterad of *st3*, flanking anterior margin of genital orifice on more uniformly sclerotized surface; posterior margin of sternogenital shield delineated by transverse suture where connected with ventrianal shield; setae *st1* and *st2* (length 22-34 μm) slightly barbed, much stouter (Fig. 7) and about 1.5 longer than *st3* and *st4* (15-20 μm), these in turn slightly longer than *st5* (15 μm). Sternogenital lyrifissures absent, as in female. Beneath anterior hinge of genital cover, genital aperture with 2 or 3 spinelike projections on either side anterolaterally, and 4 such projections anteromedially (Fig. 6). Endopodal plating present as a pair of continuous strips flanking coxae II to IV, much as in adult female except united with lateral margins of sternogenital shield. Peri-



FIGS. 9-13 : *Pyrosejus prionotus* n. gen. et sp.

9. — Palpus excluding tarsus, lateral aspect, adult female. 10. — Chelicera, lateral paraxial aspect, adult female. 11. — Leg IV excluding tarsus, ventrolateral aspect, deutonymph. 12. — Tarsus I, posterolateral aspect, with separate view of acrotarsal sensory cluster, dorsolateral aspect, adult female. 13. — Tarsus IV, ventral aspect, with separate, view of pretarsus, ventrolateral aspect, adult female.



FIG. 14 : *Pyrosejus prionotus* n. gen. et sp., adult male, body venter.

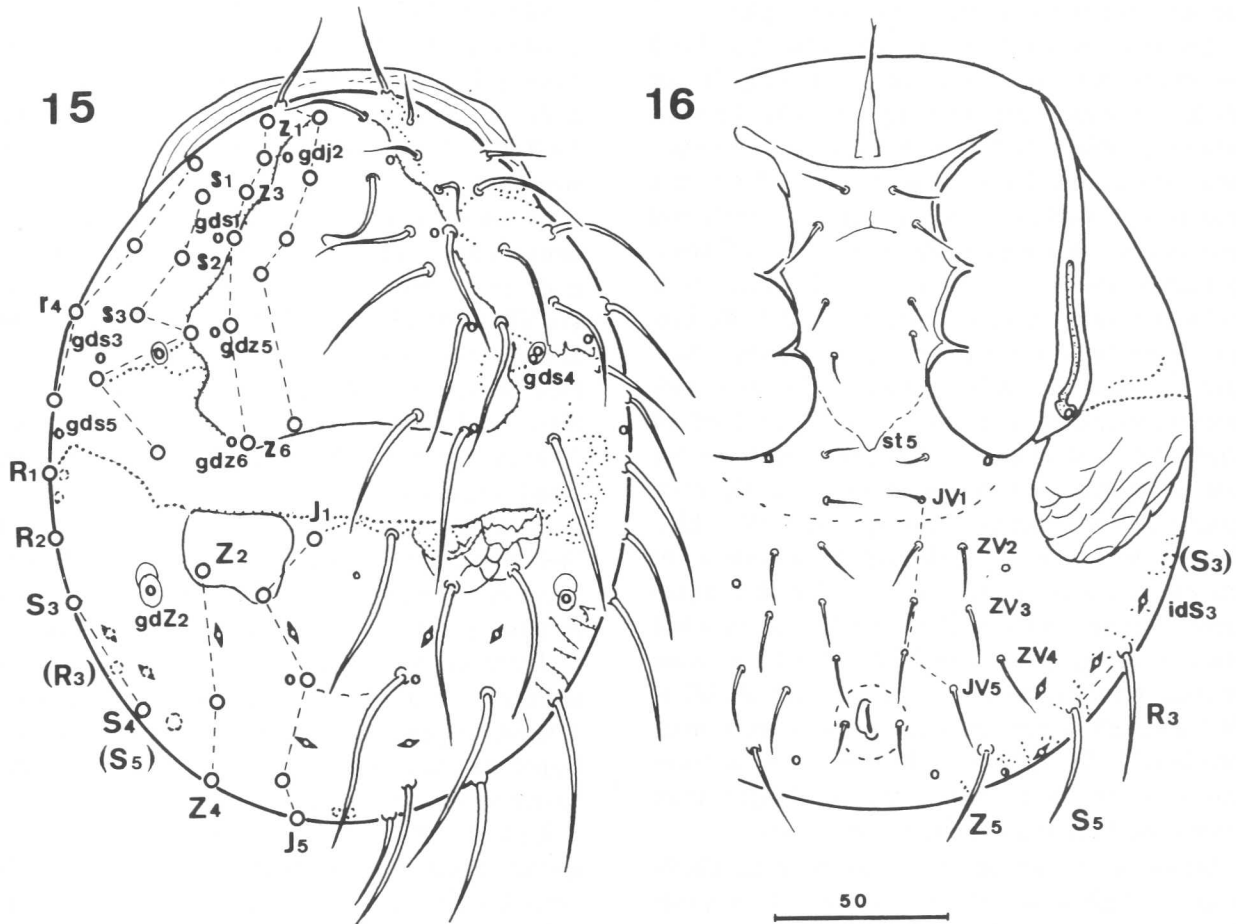
trematal-exopodal shielding with peritremes, ornamentation, and other structures formed as in adult female. Ventrianal shield as fully expansive as in adult female and similar in shape except for its broad connection with sternogenital shield and for lacking anteromedian incision there; ornamentation and complement of setae and porelike structures as in adult female except bearing also setae *JV1* anteriorly; *ZV1* absent.

Gnathosoma. Tectum formed as in adult female. Chelicerae as in adult female except brushy excrescence arising from proximoventral surface of movable chela slightly thicker and more brushy or fimbriated; movable chela lacking additional excrescences or other structures different from those

of female. Other structures of gnathosoma, including "paralaciniae" and setation of subcapitulum and palps, as in adult female.

Legs. Excluding ambulacra, lengths of leg I (212-273 μm) and leg IV (212-295 μm) each about three-fourths as long as collective length of the two dorsal shields. Form, setation and other structures of legs, including alveolar vestige of second seta, *av*, on coxae IV, as in adult female.

DEUTONYMPH. Idiosomal dorsum (Fig. 15). Idiosomal length, measured from bases of setae *j1* to those of *J5*, 237-273 μm ; width between bases of setae *R1* 183-212 μm (2 specimens). Chaetotaxy and porotaxy as in adult except gland pores *gds3* and *gdR1* simple, *gds4* and *gdZ2* double, rather than



FIGS. 15-16 : *Pyrosejus prionotus* n. gen. et sp., deutonymph.

15. — Body dorsum, with notation for setae and some porelike structures. 16. — Body venter, with notation for opisthogastric setae and porelike structures.

multiple. Podonotal shield length, from setae *j2* to *j6*, 98-100 μm ; greatest width, near level of setae *j6*, 107-112 μm ; shield with 9 pairs of setae, including *s4* barely on its weakly defined margins, and faintly ornamented laterally with reticula of microtubercles. Mesonotal plates with setae *J2* and *Z2*; these plates weakly reticulated, widely separated such that setae *J1* on soft cuticle between them. Remainder of 37 pairs of setae on soft cuticle, including 13 pairs (*j1*, *z1-z3*, *s1-s3*, *s5*, *s6*, *r2-r5*) on podonotal region, 10 pairs (*J1*, *J3-J5*, *Z3-Z4*, *S3*, *S4*, *R1*, *R2*) on opisthonotal region, and 3 pairs (*Z5*, *S5*, *R3*) inserted ventrolaterally; relative lengths of dorsal setae similar to those of adult. Soft cuticle faintly ornamented with reticula or lineae of microtubercles along lateral surfaces and across midsurface between anterior margins of mesonotal plates.

Idiosomal venter (Fig. 16). Sternogenital shield unornamented except for weak, inversely T- or Y-shaped subsurface marking medially between setae *st2*; shield with apparently 4 pairs of setae; setae *st5* subequally as long as *st3* and *st4*, but apparently inserted on soft cuticle (posterolateral margins of sternogenital shield indistinct). Sternogenital lyrifissures absent, as in adult. Gland pore *gv2* single, rather than doubled as in adult. Peritremes extending anteriorly to level of anterior margins of coxae III. Lateropeltidial shields each with microtuberculated dorsoventral ridge at level of stigma; these shields expanded posteroventrally but not sufficiently to bear any of *ZV* setae. Opisthogastric region otherwise lacking discernible shielding (one specimen with slight indication of smooth, subcircular anal plate), and with complement of setae and porelike structures as in adult male, including absence of *ZV1*; 12 pairs of setae inserted ventrally include 8 pairs of ventrals (*JV1-JV5*, *ZV2-ZV4*), para-anals, and 3 pairs ventromarginally (*Z5*, *S5*, *R3*); ventral setae similar in form and position as in adult but no longer than longitudinal intervals between their bases.

Gnathosoma. Tectum formed as in adult. Chelicerae, including ventral excrescence of movable digit, as in adult female. Other structures of gnathosoma, including "paralaciniae" and setation of subcapitulum and palps, as in adult.

Legs (Fig. 11). Excluding ambulacra, lengths of

legs I and IV (205-215 μm) each about 0.8 as long as length of idiosoma. Form, setation, and other structures of legs, including presence of alveolar vestige of second seta, *av*, on coxa IV, as in adult (Fig. 11).

PROTONYMPH and LARVA. Unknown.

TYPES. Holotype, adult female, Guatemala, Dep. Izabal, Las Escobas, 8 km SW Puerto Barrios, elev. 150-200 m, 12-14 Nov. 1986, E.E. LINDQUIST colr., ex. rainforest litter; type No. 21,658 in the Canadian National Collection.

Paratypes: 13 adult females, 6 adult males, 2 deutonymphs, deposited in the Canadian National Collection maintained by Biological Resources Division, Centre for Land and Biological Resources Research, Agriculture Canada, Ottawa, Ontario:

MEXICO. Chiapas: 4 females, ca. 50 km E San Cristobal de Las Casas, elev. ca. 2000 m, 11 May 1969, E.E. LINDQUIST colr., ex. Quercus litter; 1 male, 15 km SE Teopisca, elev. ca. 2100 m, 31 May 1969, E.E. LINDQUIST colr., ex. mixed broadleaved tree litter.

GUATEMALA. Izabal: 4 females, 3 males and 1 deutonymph, same data as holotype. 2 females, 1 male and 1 deutonymph, Montañas del Mico, 11 km SW Puerto Barrios, elev. 400 m, 15 Nov. 1986, E.E. LINDQUIST colr., ex. deep rainforest litter at base of large tree. Zacapa: 3 females and 1 male, Sierra de Las Minas, 10 km N San Lorenzo, elev. 2200 m, 7-9 Nov. 1986, E.E. LINDQUIST colr., ex. cloud forest leaf litter.

LOCALITY AND HABITAT RECORDS. Based on limited material at hand, this species appears to occur in a variety of forest litter habitats in Middle America south of the Isthmus of Tehuantepec.

ETYMOLOGY. The specific epithet, *prionotus*, is a latinized version of the Greek word "prionotos", meaning jagged or serrate, which refers to the jagged nature of the reticulate ornamentation that covers all major shields of the idiosoma.

REMARKS. *Pyrosejus prionotus* is a member of a species group that we characterize as follows. On adult females and males: (1) the marginal shields unite with the anterior dorsal shield at the level of setae *s2* and *r3*; (2) the marginal shields retain a pair of setae, *R2*, between setae *R1* and *S3*; (3) these shields lack a pair of setae, *R4*, between setae

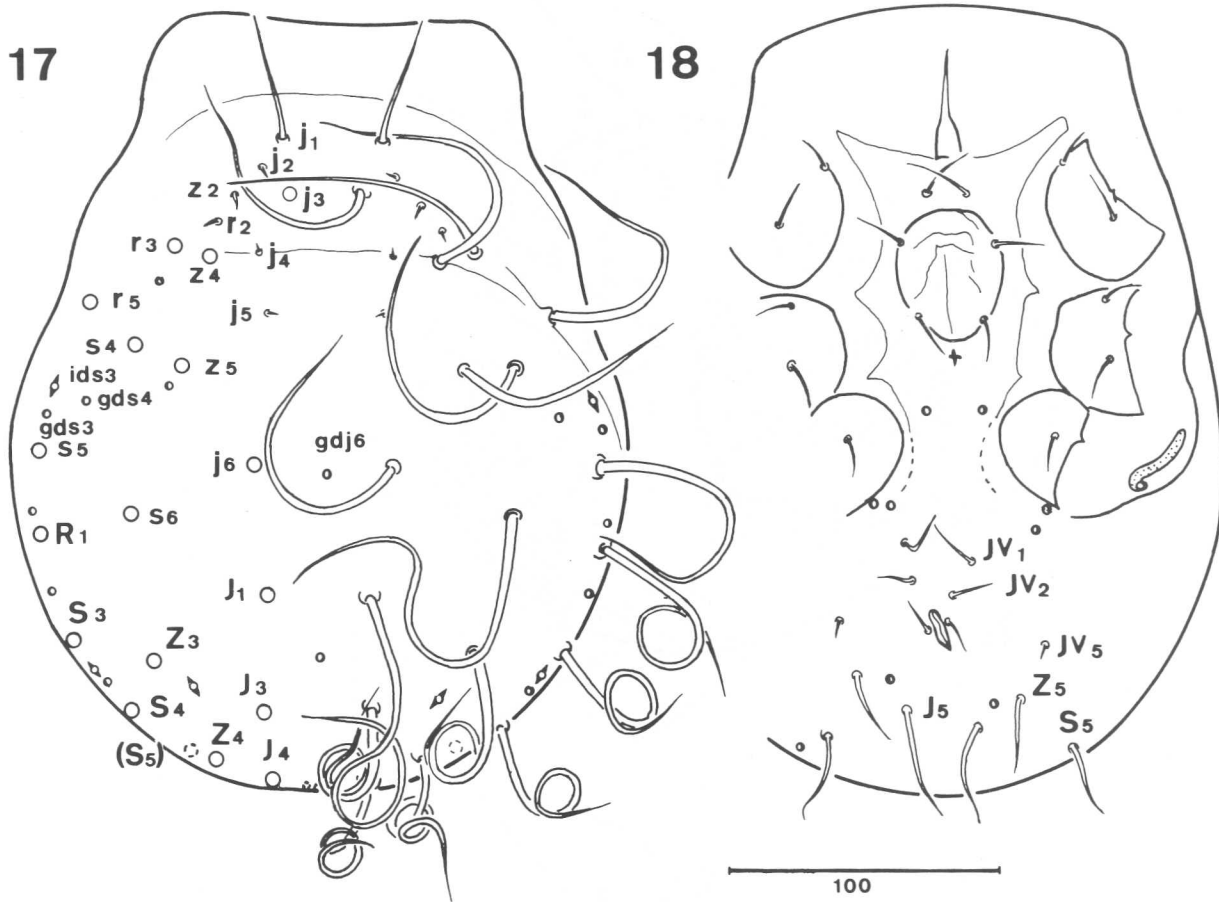


FIG. 17-18 : *Pyrosejus* n. gen., sp. 5, protonymph.

17. — Body dorsum, with notation for setae and some porelike structures. 18. — Body venter, with notation for opisthogastric setae.

S4 and *S5*; (4) poroids *idS3* and *idR4* are located ventrolaterally on the marginal shields, laterad the ridge that delineates these shields from the ventrianal shield. On adult females: (5) setae *ZV1* are present beside *JV1* on soft cuticle flanking the mesogynial shield; (6) the anterior margin of the ventrianal shield is either incised medially and separate from the mesogynial shield, or entire medially and abutting the mesogynial shield. On adult males: (7) sternal setae *st1* and sometimes *st2* are much thicker than other ventral setae. Character states (3) and (7) are regarded as synapomorphic for this group.

We have examined adult females of six species, and adult males of two of these six species, of this group. We have examined adults of three other species (both sexes of two, and males of one other) that represent a different species group, which we characterize as follows (Figs. 19, 20). On adult females and males: (1) the marginal shields unite with the anterior dorsal shield at the level of setae *s3* and *s4*; (2) the marginal shields lack setae *R2* between setae *R1* and *S3*; (3) these shields have a pair of setae, *R4*, between setae *S4* and *S5*; (4) poroids *idS3* and *idR4* are located on the ventrianal shield, mediad the ridge that delineates this shield

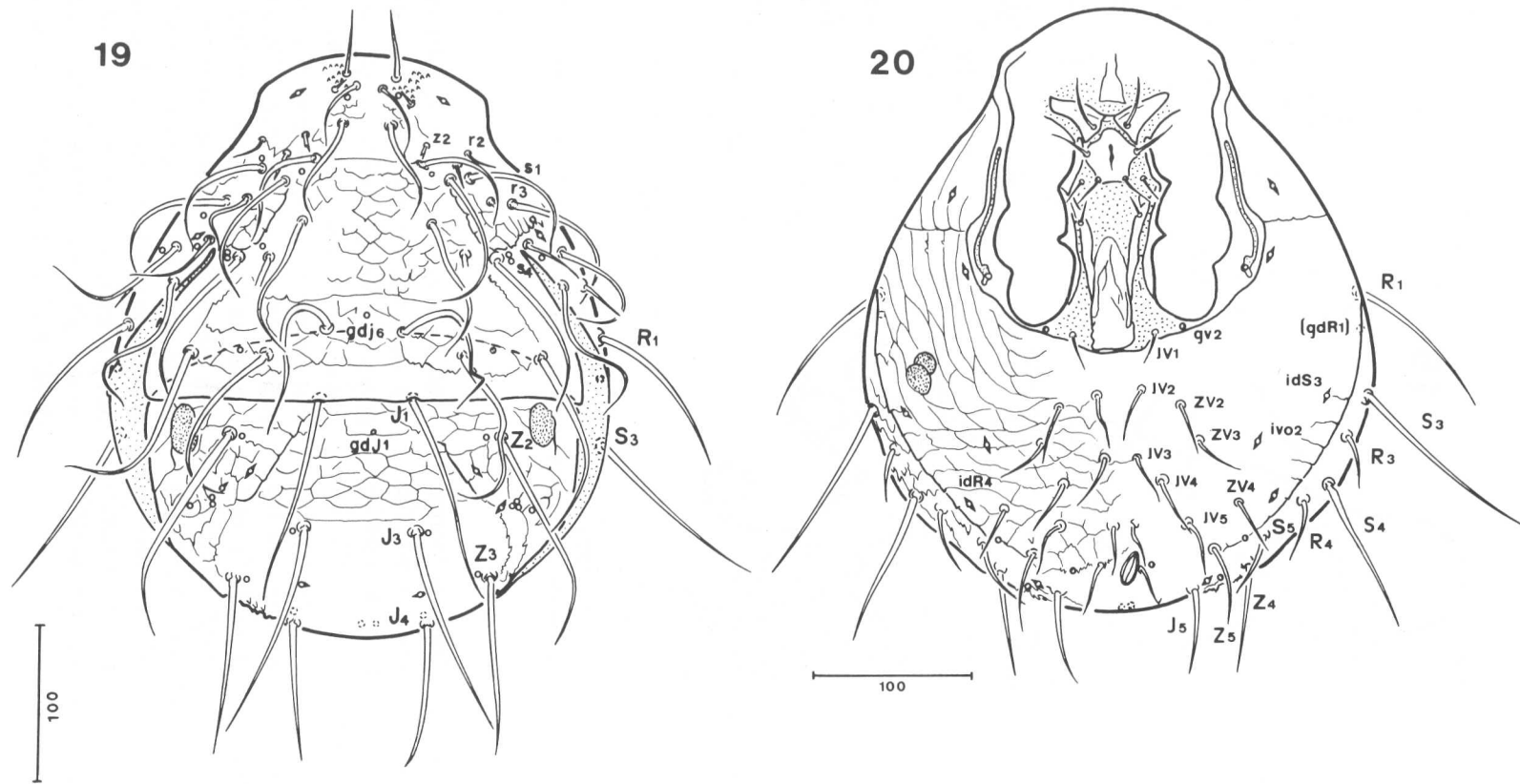


Fig. 19-20. : *Pyrosejus* n. gen., sp. 7, representing species group 2, adult female.
 19. — Body dorsum, with notation for some setae and porelike structures (compare with Fig. 1). 20. — Body venter, with notation for opisthogastric setae and porelike structures (compare with Fig. 2).

from the marginal shields. On adult females : (5) setae *ZV1* are absent ; (6) the anterior margin of the ventrianal shield is entire medially and abuts the mesogynial shield. On adult males : (7) sternal setae *st1* and *st2* are not markedly thicker than other ventral setae. Character states (2), (5), and possibly (1) and (4) are regarded as synapomorphic for this group.

Without seeing adult specimens of the first group represented by *P. prionotus*, one would probably denote the gland pores and poroids located on the periphery of the ventrianal shield in adults of the second group as inguinal *ii2* and opisthogastric *ivo3*, respectively. However, we view it as more probable and physiologically parsimonious that these structures are the same as found in the first group, and have simply shifted slightly more ventrally in position in the second group, rather than the structures of the first group being lost and replaced by *de novo* structures in the second group (compare Figs. 2 and 20). Assuming that these structures are homologous between these two groups, an alternative possibility is that they are originally ventral structures, as in the second group, which have simply shifted slightly more dorsolaterally in position in the first group. However, a pair of poroids adjacent to setae *R4* are found among representatives of many families of Mesostigmata, including those of the supercohort Monogynaspida in which they are commonly denoted as *Rp*. Comparative studies of material representing other taxa of Cercomegistina and early derivative Mesostigmata are needed to resolve the homologies of these structures.

Our interpretation of homologies of setae in the

S and *R* series in adults and deutonymphs of these two species groups needs further comment. As the same number of setae are present in both groups, two interpretations are evident. Ours is that *different* marginal setae are present (*R2* present, *R4* absent in the first group, and *R2* absent, *R4* present in the second group), that lateral setae *S3* and *S5* retain a consistent position adjacent to poroids *idS3* and *idR4*, respectively, and that setae *S3* and *S4* are consistently inserted slightly dorsad neighboring marginal setae *R3*. The alternative is that the same marginal setae (*R2* and *R3*) are consistently present and *R4* consistently absent in both groups, but that in the second group *S3* is more removed from poroid *idS3*, and setae *S3* and *S4* are inserted slightly ventrad neighboring marginal setae *R3*, than in the first group. In the latter case, *S3* would be changed to *R2*, *R3* to *S3*, *S4* to *R3*, and *R4* to *S4* in Fig. 20. We prefer the first interpretation for several reasons. First, the *R*-marginal setae other than *R1* are deutonymphal ontogenetically, and their presence appears to be unstable in this family, based on their absence in representatives of the one species of the second (undescribed) genus at hand. Second, setae *S3* are stable with respect to both their position adjacent to poroids *idS3* and their position relative to the levels of opisthogastric structures such as setae *ZV2* and poroids *ivo2*. Third, setae *S3* maintain their customary position dorsad adjacent marginal setae *R3*.

We refrain from formally recognizing and naming these species groupings as characterized above, until further material is studied and additional species are described.

DISCUSSION

In the cohort Cercomegistina, three of the four previously described families are essentially monobasic, each based on one genus with but one or two species. This may reflect any of several factors. First, there evidently is inadequate sampling and representation available of extant taxa in this group, as indicated by the variety of undescribed

taxa examined by KETHLEY (1977), as well as by us, primarily from less accessible tropical regions. Second, a considerable variety of genera, for which material is available in limited collections from these regions, remain undescribed. Third, Cercomegistina appears to represent a relatively early derivative lineage of Trigynaspida, according to CAMIN

and GORIOSSI (1955), such that extant taxa are very disparate and possibly relictual in nature. Fourth, recent studies of this cohort have tended to focus on these disparities, rather than look for similarities, with a resultant splitting rather than lumping of genera into family level categories. For example, although ATHIAS-HENRIOT (1959a, 1959b) recognized the distinctiveness of the genus *Seiodes* Berlese and could not classify it in any of the families or superfamilies of Trigynaspida, she chose not to propose a separate family for this taxon because of the conceptual uncertainties of the cohorts and superfamilies related to this genus. By contrast, 15 years later, KETHLEY (1977)¹ proposed a separate family for this taxon, even though it remains monobasic. With this perspective, initially we were hesitant in proposing yet another family for another distinctive group of species in this cohort. However, the Pyrosejidae encompasses several species representing three species groups and two genera, which can not be accommodated in any of the other four families of Cercomegistina, as elaborated above, without rendering the definition of any one of those families nearly meaningless conceptually. As already noted, the families of Cercomegistina (and of Trigynaspida in general) have not been analyzed cladistically. We therefore have proposed Pyrosejidae within the framework of family, superfamily, and cohort concepts as currently accepted in the Trigynaspida, fully realizing that this framework appears to be rampant with plesiomorphies and homoplasies in the definitions of family group taxa.

Representatives of Pyrosejidae retain, amidst the apomorphies discussed below, a diversity of apparent plesiomorphies such as : nymphs and adults with an alveolar vestige of seta *av* on coxa IV, a seta denotable as *av-1* on femur IV (see below), and paired claws usually on leg I; adults with two subequal dorsal shields; adult females with separate latigynial and mesogynial elements; and adult males lacking modified setae on leg II. The lack of hypertrichy in the protonymphal and subsequent

instars, amidst such hypertrichy in most families of Trigynaspida (as well as of Uropodina and Sejina), may be apomorphic. This hypothesis is reinforced by trends toward opisthotal hypotrichy in the Pyrosejidae, which may be a synapomorphy shared with Asternoseiidae and evidence for a sister-group relationship between these two families. The presence of well developed marginal shields in adults of Pyrosejidae is of uncertain polarity. If secondary in origin, this state would provide another apomorphy linking this family with Asternoseiidae and, in turn, with Seioididae as noted in the remarks above (whether seioidids lack hypertrichy in the protonymph is not recorded). The expansive ventrianal shield in adult pyrosejids, such that it is fully coalesced with peritrematal-exopodal-metapodal shielding anterolaterally and with the marginal shields laterally, appears to be autapomorphic for this family within the Cercomegistina. Based on the data in KETHLEY's (1977) analysis of leg setation among the known taxa of Trigynaspida, the losses of setae *pv-3* on femur I and *al-2* on femur IV appear to be autapomorphic for this family within the Cercomegistina, though homoplastic in occurring elsewhere within the Trigynaspida.

Finally, the presence of "paralacinae" as found in nymphs and adults of Pyrosejidae appears to be unique to it among the families of Cercomegistina. Similar structures have been observed elsewhere in the Trigynaspida only in the schizogyniid genus *Choriarchus*, by KINN (1966), who called them "external malae". However, such structures may have been overlooked in the descriptions of some other trigynaspid taxa. We doubt that these enigmatic structures are homologous in origin with those found in certain genera such as *Nenteria* within the Uropodina. They may derive from independent origins also within Trigynaspida, as their form is sexually dimorphic in *Choriarchus*, according to our observations as well as the illustrations by KINN (1966), which contrasts with their condition in Pyrosejidae. In his review of higher categories of the supercohort Trigynaspida,

1. KETHLEY first proposed this and other concepts concerning family groupings in Trigynaspida in 1974, at the 4th International Congress of Acarology, Saalfelden, the proceedings of which were not published until 1979 !)

KETHLEY (1977) presented character state data for the leg chaetotaxy of 85 taxa. These taxa were purported to represent all described families of Trigynaspida and a number of undescribed genera, including nine representing two undescribed families of Cercomegistina that were to be treated in subsequent work. However, it is not clear whether his data include the family Asternoseiidae, as the only described genus, *Asternoseius*, is not listed among the taxa studied². From his analysis of leg chaetotaxy and resultant cladograms based on data from these taxa, it is clear that taxa representing the new family Pyrosejidae, as described herein, were not among those studied by KETHLEY, for reasons that follow. First, he apparently did not find the chaetotactic formula of (1-2/1,2/1-1) for femur IV among any of the taxa in the cohort Cercomegistina that were studied by him, as he indicated the loss of seta *av-1* on femur IV to be the sole leg setal character state unique (autapomorphic) for the cohort Cercomegistina in the Trigynaspida. Second, he did not record the losses of *pv-3* on femur I and *al-2* on femur IV among any of the taxa of Cercomegistina. Third, when the leg setal character states of Pyrosejidae are superimposed on the cladograms based on the taxa analyzed by KETHLEY, discord is evident in the most basal dichotomy that segregates the Cercomegistina and Antennophorina. Pyrosejidae is characterized both by the loss of seta *al-2* on femur IV, which is unique to Antennophorina in KETHLEY's cladograms, and by the losses of *pd-3* on tibia I and *pd-3* on femur IV, which are characteristic of Cercomegistina, though homoplastic also within Antennophorina, in KETHLEY's cladograms. A possible explanation for the discord in setal losses on femur IV may lie in different interpretations between KETHLEY and us concerning the setal homologies of these losses, as noted further below. In the absence of figures, especially for the femora, KETHLEY's interpretations of chaetotactic formulas can not be compared or confirmed without a re-examination of representa-

tives of many of the taxa examined by him, which is not within the scope of this paper.

In his analysis of leg chaetotaxy of taxa of trigynaspid mites, KETHLEY (1977) listed the maximum numbers of setae that he found for each of the femora, genua and tibiae of legs I to IV. With few exceptions (*e.g.*, seta *md* on tibia I, *ad-3* on tibia IV, *ad-3* on femur IV), he hypothesized the presence of a given seta as a primitive condition, and its absence as a derived state. However, he did not hypothesize archetypical chaetotaxies for these leg segments, as his list of maximal numbers falls short of indicating these. Based on the list of setal losses included in KETHLEY's study, as well as on the leg chaetotaxies presented in sufficient detail in descriptions of various taxa of Trigynaspida by other workers (*e.g.*, GO 1980, KINN 1968, 1970, 1972) and on the general background patterns of leg chaetotaxy in the Gamasina (EVANS 1963), archetypical chaetotaxies can be hypothesized for the Trigynaspida as follows :

	leg I	leg II	leg III	leg IV
femora	2-3/2,2/3-2	2-2/1,2/2-1	2-2/1,2/1-1	2-2/1,3/1-2
genua	2-3/1,3/1-2	2-3/1,3/1-2	2-3/1,3/1-2	2-3/1,3/1-2
tibiae	2-3/2,3/2-2	2-2/1,2/1-2	2-2/1,2/1-2	2-2/2,2/1-2

On this archetypical background, the losses of setae in Pyrosejidae can be reviewed as follows : *ad-3* and *pv-3* on femur I, *al-2* and *pl-1* on femur III, *pd-3*, *al-2* and *pl-2* on femur IV, *pd-3* on genua I-II, *pv-1* on genua III-IV, *pl-2* on genu IV, *pd-3* and *pl-2* on tibia I, *pl-2* on tibia IV. As presented in KETHLEY's analysis, the losses of *pd-3* on tibia I and *pd-3* on femur IV are characteristic of Cercomegistina as a whole, though homoplastic losses of these setae occur several times within the Antennophorina. The loss of *al-2* on femur IV is exclusively apomorphic for the Antennophorina as a whole in KETHLEY's analysis. Our find of this loss in Pyrosejidae may represent a difference in interpretation of femur IV setal homologies between us and KETHLEY : if the seta that we denote as *av-1* (simply

2. The cladograms in figures 1 and 2 of KETHLEY's study include in the cercomegistine branching sequence a taxon representing undescribed new genus 2, numbered 69-77, with 5 species from Mexico. This may be the same as the undescribed genus representing 5 undescribed species, which is mentioned under the family Asternoseiidae elsewhere in his paper.

av in Fig. 11) is viewed as being more lateral in origin, it could be denoted as one of two *al* setae, with *av-1* absent, as characterized for Cercomegistina as a whole by KETHLEY. The losses of *pd-3* from genu I and *pv-1* from genua III and IV characterize a grouping of taxa exclusive of Cercomegistidae within Cercomegistina in KETHLEY's analysis, while the losses of *pd-3* from genu II and *pl-2* from genu IV are homoplasies within both Cercomegistina and Antennophorina. The loss of *pl-2* from tibia I is possibly synapomorphic with Asternoseiidae in the Cercomegistina (see footnote 2), though homoplastic losses of this seta are also found among several taxa within Antennophorina. The loss of *al-2* from femur III is possibly synapomorphic with Seiodidae; its convergent loss is noted only once, for Aenictequidae in Antennophorina, by KETHLEY. The losses of *pv-3* from femur I and *al-2* from femur IV are unique to Pyrosejidae among the known taxa of Cercomegistina as presented in KETHLEY's analysis, though homoplastic losses of these setae were noted in Antennophorina. Finally, the losses of *ad-3* on femur I and *pl-1* on femur III are not among the chaetotactic characters listed in KETHLEY's analysis, so their uniqueness in Pyrosejidae is not clear.

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