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PARCIPROMUS, N. GEN., A XYSTODESMID MILLIPED GENUS FROM THE SIERRA NEVADA MOUNTAINS, CALIFORNIA (POLYDESMIDA)

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ABSTRACT

The new xystocheirine genus *Parcipromus* is proposed for *Xystocheir cooki* Causey and two new species from the Sierra Nevada Range; they occur from Kings River Canyon, Fresno County, to the Greenhorn mountains in southern Tulare County. The genus occurs at the highest elevations of any Nearctic xystodesmid taxon, as its species live in or near Giant Sequoia Groves at 6-7,000'. Characterized in part by a simple, undivided, and curved acropodite, and a prefemoral process on the outer (caudal) side of the prefemur, *Parcipromus* differs markedly from other tribal components that possess two or more separate acropodal projections and a prefemoral process on the inner (anterior) surface. The species are distinguished primarily by the acropodal configuration, the length of the prefemoral process, and, if present, the size and shape of the latter's lateral spine. Descriptions are presented for the new taxa along with diagnostic illustrations and a key to species.

The Sierra Nevada Mountain Range of California harbors a diverse xystodesmid milliped fauna, all on the moist, heavily forested western slope, because the eastern slope, abutting the Great Basin and Mojave Deserts, is arid with sparse vegetation. *Wamokia* Chamberlin, a representative of the Xystocheirini, is endemic to the northern sector, as its seven species extend from central Nevada to northern Amador counties (Buckett and Gardner 1968), and the monotypic genus *Ochthocelata* Shelley, a representative of the Sigocheirini, is known only from the southern extremity of the range in Kern County (Shelley, in press). The other sigmocheirine genus, *Sigmocheir* Chamberlin, is essentially endemic to the Sierras, as its three species occur from Placer to Tulare counties, and westward into the foothills and the eastern fringe of the San Joaquin Valley in Sacramento and Fresno counties (Shelley, in press). *Selenocheir* Shelley (Chonaphini) and *Xystocheir* Cook (Xystocheirini), which extend westward to the Pacific Ocean, are represented in the central Sierras by one and about six species, respectively, most of the latter being undescribed (Shelley 1994, plus unreported specimens examined by the author). Similarly, *Motyxia*

Chamberlin (*Xystocheirini*) is represented by seven species in the southern Sierras, from Sequoia National Park southward, with another occurring to the south and west in the Tehachapi and Santa Monica Mountains (Causey & Tiemann 1969). This contribution diagnoses a seventh Sierran xystodesmid genus, also a representative of the *Xystocheirini*, which consists of three species endemic to Tulare and southern Fresno counties (Figs. 1-2), the region encompassing Kings Canyon and Sequoia National Parks, and high elevations to the south in the Sequoia National Forest. Acronyms of sources of preserved study material are as follows:

CAS - California Academy of Sciences, San Francisco.

FSCA - Florida State Collection of Arthropods, Gainesville.

LACMNH - Los Angeles County Museum of Natural History, Los Angeles, California.

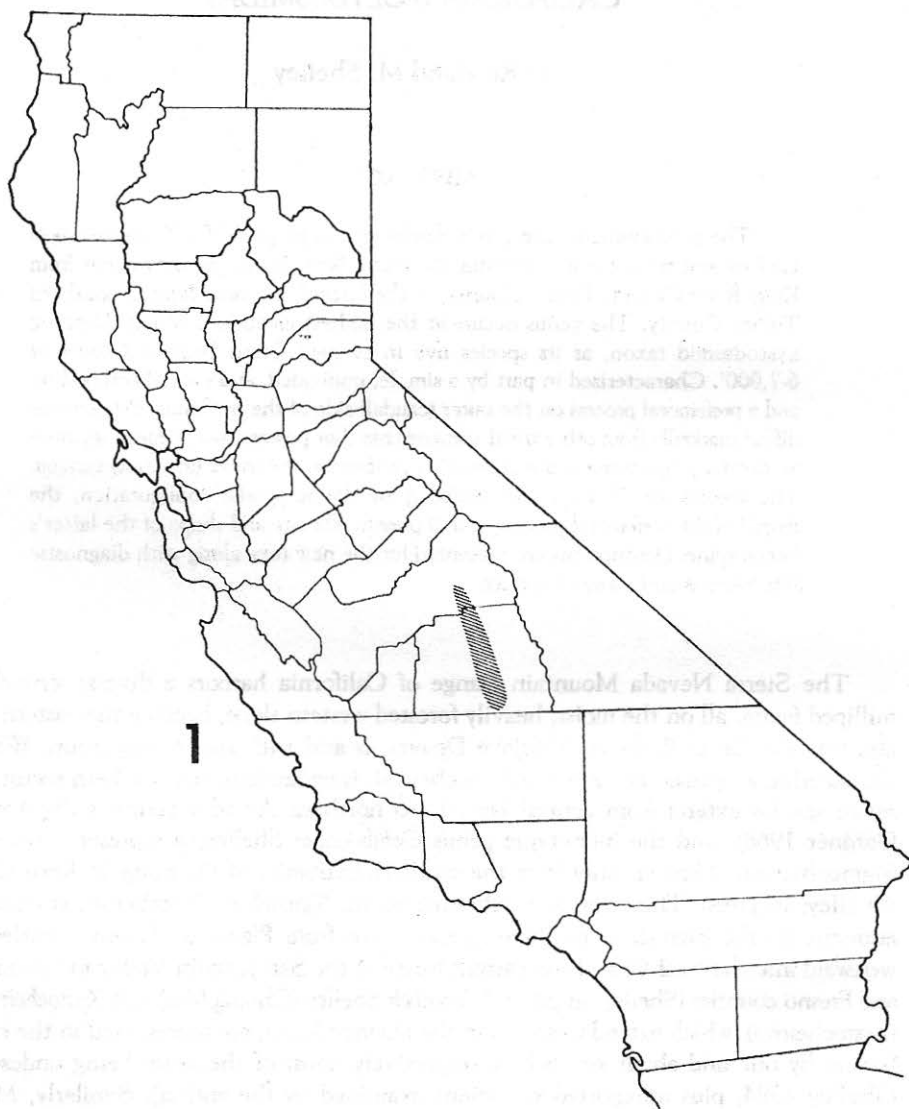


Fig. 1. Distribution of *Parcipromus*.

NCSM - North Carolina State Museum of Natural Sciences, Raleigh.

NMNH - National Museum of Natural History, Smithsonian Institution, Washington, D.C.

VMNH - Virginia Museum of Natural History, Martinsville.

Parcipromus, new genus

Type species: *Parcipromus tiemanni*, new species.

Diagnosis: Characterized by apically decurved or uncinat prefemoral spines on midbody and caudal legs in both sexes; prefemoral process located on outer (caudal) side of prefemur, fused to latter for its entire length, with or without variable distal spine on lateral margin, either extending well beyond distal extremity of prefemur and curving parallel to acropodite, or terminating at distal extremity of prefemur with lateral spine projecting distad as apparently separate projection, creating appearance of femoral acropodal process; acropodite narrower than, and clearly demarcated from, prefemur, simple and undivided, a single, ventrally curved projection with variable lateral spine at midlength, with or without expanded, broadly rounded flange on outer margin.

Color in life: Unknown. All specimens except that of *P. cooki* from Sequoia Lake were collected before 1973 and are a uniform tawny yellow, having lost all trace of the natural pigmentation pattern after 20 or more years in preservative. The Sequoia Lake specimen of *P. cooki* was pale white and freshly molted, without evidence of color or pattern.

Description: A genus of small to moderate-size xystocheirine Xystodesminae with the following characteristics.

Body composed of head and 20 segments in both sexes, essentially parallel-sided, tapering at both ends.

Head of normal appearance, smooth, polished to granular. Epicranial suture distinct or indistinct, terminating well above interantennal region. Antennae relatively long and slender, becoming progressively more hirsute distad, with 4 conical sensory cones on ultimate article, no other sensory structures apparent. Genae not margined laterally, with faint or distinct central impressions, ends broadly rounded and extending just beyond adjacent cranial margins. Facial setae with epicranial, subantennal, frontal, genal, clypeal and labral series present; interantennal setae absent.

Terga smooth and polished on anteriormost segments, becoming roughened and papillate on segments 4-5, papillae becoming generally stronger, more distinct, and subtuberculate caudad, arranged in 2 or 3 rows, occasional papillae displaced. Collum broad, ends terminating well above those of succeeding tergite. Paranota well developed throughout body, broadest on anterior tergites, either without, or with only a few papillae on inner surface, moderately declined and angling ventrolaterad, continuing slope of dorsum, anterior corners rounded, caudolateral corners rounded on anterior tergites, blunt, extended, and acuminate in midbody region, becoming progressively more blunt caudad. Peritremata moderately distinct, moderately elevated above paranotal surfaces; ozopores located well caudal to midlength, opening ventrolaterad. Caudal segments normal for family.

Sides of metazonites smooth and polished or subgranular, with at most only slight suggestions of supracoxal knobs on anterior segments. Strictures distinct. Gonapophyses relatively long, moderately broad, clearly extended from 2nd coxae, fitting between 3rd coxal lobes *in situ*. Pregonopodal sterna glabrous, either unmodified or with only very slight conical lobes subtending 4th coxae; 6th sternum moderately depressed between 7th legs to accommodate gonopodal telopodites. Postgonopodal sterna glabrous and unmodified, with only slight suggestions of bicruciform impressions, caudal margins gently curved. 2nd female

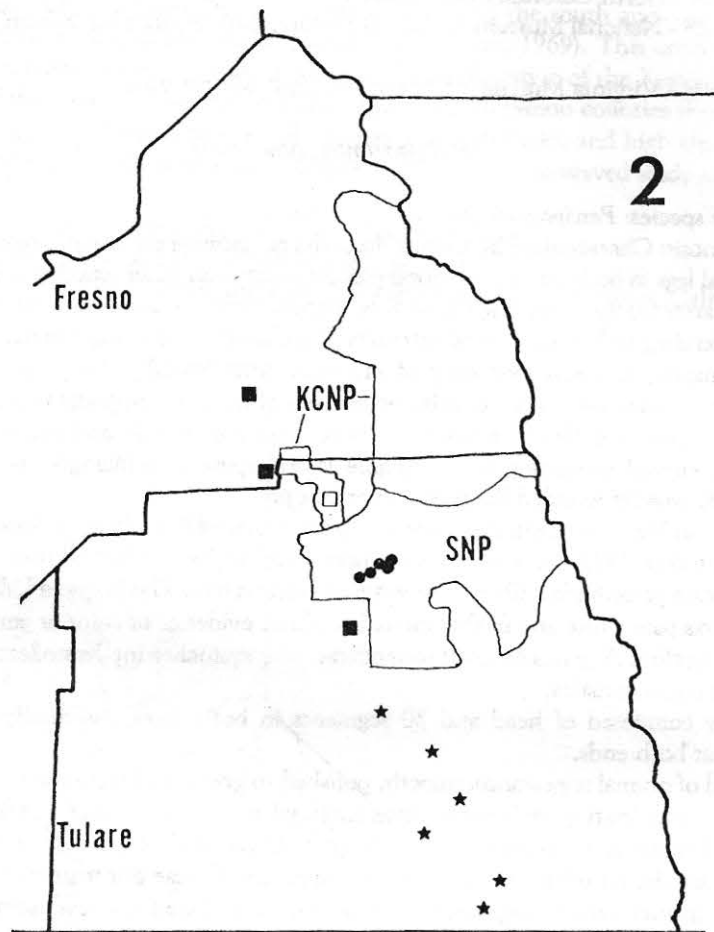
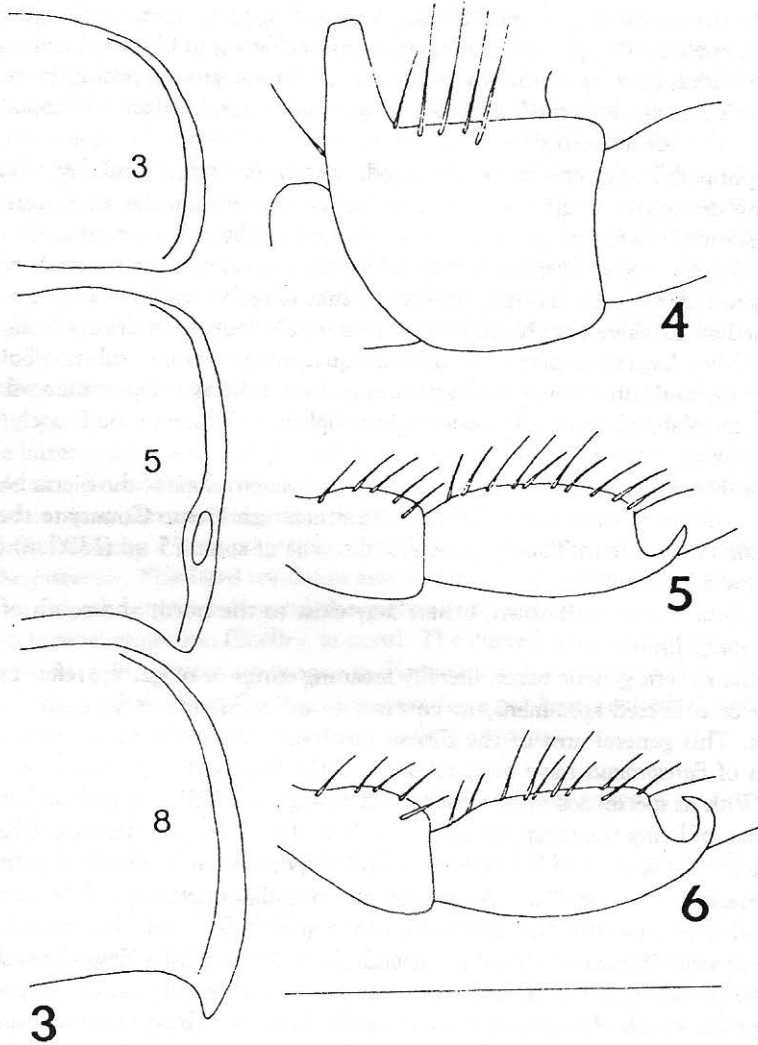


Fig. 2. Distributions of species of *Parcipromus*. Stars, *P. tiemanni*; dots, *P. gigantearboricolus*; squares, *P. cooki*. KCNP, Kings Canyon National Park; SNP, Sequoia National Park. The open square denotes the type locality of *P. cooki* in the Redwood Mountain Section of Kings Canyon National Park.

coxae with strong, elongate, caudally directed lobes; 3rd male coxae with strong subconical, anteriorly directed lobes situated outside lateral surfaces of gonapophyses *in situ*; remaining coxae without projections. Prefemora on segments 5-18 with variable distoventral spines, arising weakly on 4th legs, becoming progressively longer and spiniform through 7th legs, curving downward or dorsad apically around segment 10 and becoming progressively more uncinat caudad. Hypoproct broadly rounded, paraprocts with margins strongly thickened.

Gonopodal aperture broadly ovoid, indented slightly anteriolaterad, sides and caudal margin elevated above metazonal surface, caudolateral corners and/or caudal margin slightly flared. Gonopods *in situ* with telopodites extending directly anterior in subparallel arrangement, apices overlapping. Coxa moderately large, with one, rarely two, long, silken macrosetae above cannula, narrowly segregated from opposite member by moderately



Figs. 3-6. *P. tiemanni*. 3, paranotal profiles of segments 3, 5, 8 of holotype. 4, 3rd coxal lobe. 5, basal podomeres of midbody leg. 6, basal podomeres of caudal leg. Scale line = 3.33 mm for fig. 3, 1.00 mm for fig. 4, 2.78 mm for figs. 5-6.

sclerotized sternum, latter oriented lengthwise, along longitudinal, anterior/posterior, body axis, with moderately long sternal apodeme. Prefemur variably broad and long, broader than, and clearly demarcated from, acropodite, but merging smoothly with latter, narrow basally, expanding moderately to strongly at 1/4 length on outer (caudal) surface; prefemoral process arising basally as cupulate medial expansion on outer side of prefemur, fused to latter for its entire length, medial margin expanded with variable teeth, spurs, and other projections, lateral margin with or without variable distal spiniform projection, stem of process either extending beyond distal extremity of prefemur and curving subparallel to acropodite, or terminating at level of distal extremity of prefemur with lateral spiniform projection continuing distad and appearing as separate femoral process. Acropodite narrower basally than prefemur, arising smoothly from inner side of latter, curving ventrad, either broad and

blade-like throughout length or outer margin expanding proximal to midlength into broadly rounded, cupulate flange leaning mediad, sides narrowing to blunt or acuminate tip, with variable lateral spur or spiniform projection. Prostatic groove arising in pit in base of prefemur, running along medial surface of latter and lateral surface of acropodite, opening on tip or inner distal corner.

Cyphopodal aperture relatively broad, widely encircling 2nd legs, caudal margin elevating strongly in midline into broad, thickened, subtriangular lobe, leaning anteriorly, latter inserting between projections from 2nd coxae. Cyphopods *in situ* located caudal to 2nd legs, hidden by lobe of aperture and coxal projection, oriented transversely with common valvular surface directed ventrad. Receptacle subtriangular, small to moderate-size, located dorsomedial to valves, with only a few moderately long hairs arising from ventralmost corner. Valves large to moderate-size and subequal, subquadrate to subrhomboid, with long hairs arising from anterior and caudal surfaces and ventral edges. Operculum relatively large, located dorsolaterad to valves, moderately to lightly hirsute with moderately long, curved hairs.

Distribution: A narrow, linear band along the western slope of the Sierra Nevada Range of California from Kings River Canyon in southeastern Fresno County to the Greenhorn Mountains in southern Tulare County, a distance of some 75 mi (120 km) (Fig. 1). The species are allopatric.

Species: Three are known, others may exist to the north and south of the present generic range limits.

Remarks: The generic name, literally meaning stingy or niggardly, refers to the relative paucity of collected specimens, in contrast to other Sierran genera like *Xystocheir* and *Motyxia*. This general area of the Sierras has been intensively investigated, yet only 16 samples of *Parcipromus* have been taken, as if the mountains were reluctant to yield this secret. With its species occurring from around 3,500' to 7,300', *Parcipromus* has the marked distinction of being the most elevated xystodesmid genus in the Nearctic. I have collected an undescribed species of *Xystocheir* in the Mariposa Sequoia Grove, Yosemite National Park, Mariposa County, but the species of *Parcipromus* are the only xystodesmids that consistently occur at the high elevations of the giant trees.

Parcipromus is readily assigned to the endemic California tribe Xystocheirini, defined by Hoffman (1980) in part as having conical processes on the third male legs and cylindrical coxal processes on the second pair of legs in females. These structures are present in *Parcipromus*, and in the typical posture, with the head curled under and the anterior segments tightly compressed, the caudally directed gonapophyses are situated inside and very close to, if not actually touching, the anteriorly directed 3rd coxal lobes. Similarly in females, the 2nd coxal projections, directed caudad, fit on either side of the medial lobe on the caudal margin of the cyphopodal aperture; together, they effectively close the aperture, which broadly encircles the 2nd legs. These features suggest that spermatophore transfer in the Xystocheirini is somewhat different than in other xystodesmid tribes. The close physical juxtaposition of the gonapophyses and 3rd coxal lobes in males implies a reproductive function for the latter, and my impression is of "guides" to correctly position and align the gonapophyses. The coxal projections in females have a lateral concavity and most show an apical black dot, suggesting a residual trace of glandular secretion. Perhaps the female projections contain a basal gland whose secretion helps dissolve the matrix of the spermatophore when it is inserted into the cyphopods.

Although I have not yet fully studied the Xystocheirini, most of the specimens that I have examined display papillate or tuberculate tergites, so correspondence in this feature also relegates *Parcipromus* to this tribe. Some oriental xystodesmids, representatives of the tribe

Harpaphini, also exhibit tergal papillae in rows, but the Nearctic representatives of this tribe, the genera *Harpaphe*, *Isaphe*, and *Thrinaphe*, have smooth tergites. Because of disparities in the number of telopodal projections, relationships within the Harpaphini are uncertain; the Oriental genera have never been comprehensively studied throughout their ranges, and the Nearctic genera appear to constitute a monophyletic group (Shelley 1993). Perhaps these similarly papillate tergites represent a degree of affinity, possibly even a synapomorphy, between the Xystocheirini and these Asiatic xystodesmids, which may require a new tribe with the Harpaphini being restricted to the Nearctic genera. Resolution of these questions awaits definitive research on the Asiatic genera *Riukiaria*, *Yaetekaria*, *Koreoaria*, *Levizonus*, *Phruodesmus*, and *Nikkonus*. Tanabe (1988, 1990, 1994) has recently published on Japanese species of *Riukiaria* and *Levizonus*, and has synonymized *Profontaria* and *Ezodesmus* with *Levizonus*.

The key diagnostic features of *Parcipromus* are the curved, undivided acropodite and the position of the prefemoral process on the outer (caudal) side of the prefemur. To my knowledge the latter is unique to *Parcipromus*, as in other xystodesmid genera regardless of tribe the projection arises on the inner (anterior) side of the prefemur. The prefemoral process also arises as an elevated ridge that is fused to the prefemur for the latter's entire length and only becomes a true projection distad, where it extends beyond the distal extremity of the prefemur. This fused condition also is found in *Sigmocheir*, where the process is on the inner side and extends beyond the prefemur to form a synfemoral process by blending with a femoral projection (Shelley, in press). The curved to uncinatate spines on the ambulatory prefemora apparently are unique to *Parcipromus*, but their condition has not been checked in other tribal genera. Because these taxa have not been revised, the affinities of *Parcipromus* are unknown and will be assessed in future studies.

Key to the Species of *Parcipromus*, based on adult males

1. Acropodite blade-like for entire length, outer margin not expanded (Figs. 20-22, 24-25, 27); from Kings River Canyon region of Fresno County to vicinity of southern section of Sequoia National Park, Tulare County *cooki* (Causey)
- Acropodite with outer margin expanding into broadly rounded, laminate flange 2
2. Stem of prefemoral process continuing distad well beyond distal extremity of prefemur, lateral spiniform projection short, clearly attached to stem of process (Figs. 9-11); Tulare County south of Sequoia National Park *tiemanni*, n. sp.
- Stem of prefemoral process terminating abruptly at level of distal extremity of prefemur, lateral spiniform projection long, continuing distad as apparent femoral process (Figs. 16-18); Giant Forest area of Sequoia National Park, Tulare County *gigantoarboricolus*, n. sp.

Parcipromus tiemanni, new species

Figs. 3-14

Type specimens: Male holotype and 13 male and 2 female paratypes (FSCA) collected by D. L. Tiemann, 1 June 1963, at Redwood Meadows Campground, Sequoia National Forest, ca. 11.2 mi (17.9 km) south of Camp Nelson, Tulare County, California. One female paratype taken by same collector at same site on 16 June 1963. One male paratype deposited in both the NMNH and VMNH.

Diagnosis: Prefemoral process continuing distad beyond distal extremity of prefemur, curving subparallel to, and widely segregated from, acropodite, lateral spiniform projection

short, clearly attached to stem of process; acropodite with outer margin expanding into broadly rounded flange.

Holotype: Length 21.0 mm, maximum width 4.5 mm, W/L ratio 24.1%, D/W ratio 64.4%.

Epicranial suture distinct. Width across genal apices 1.9 mm, interantennal isthmus 0.8 mm. Antennae reaching back to midlength of 3rd tergite; relative lengths of antennomeres $3 > 6 > 2 > 5 > 4 > 1 > 7$. Genae with distinct central impressions. Facial setae as follows: epicranial 2-2, subantennal 1-1, frontal 1-1, genal 2-2, clypeal about 12-12, labral about 18-18.

Dorsum smooth and polished on segments 1-4, roughened and papillate on remaining segments, papillae small and rounded, arranged in two poorly defined rows. Paranota not papillate; caudolateral corners rounded on tergites 1-3, blunt on 4, extended on remaining segments, apically acuminate on 5-13 (Fig. 3), blunt on 14, becoming progressively broader and more rounded caudad.

Sides of metazonites smooth, polished. 4th sternum with two short, acuminate, conical lobes subtending 4th coxae, unmodified between 5th legs. 3rd coxae with strong, subconical lobes arising basally, directed anteriorly (Fig. 4); prefemora on segments 5-18 with variable distoventral spines, faint on 4th legs, longer and spiniform through 7th legs, becoming decurved apically on segment 10 and becoming progressively more decurved to uncinata caudad (Figs. 5-6).

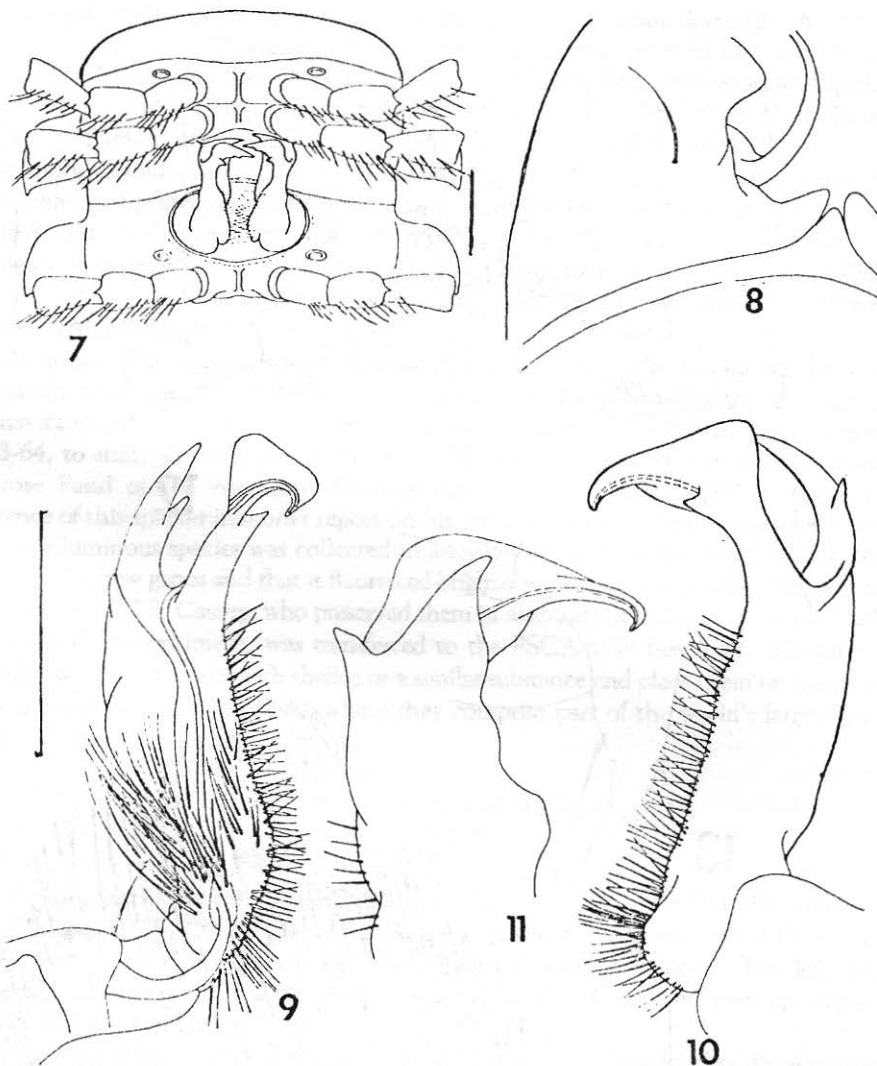
Gonopodal aperture 1.8 mm wide and 0.8 mm long at midpoint, sides elevating smoothly and continuously to caudolateral corners, curving onto caudal margin and dropping slightly in midline, caudal margin slightly flared. Gonopods *in situ* (Fig. 7, of paratype) with telopodites overhanging anterior margin of aperture and 6th sternum, apices overlapping. Gonopod structure as follows (Figs. 8-11): Coxae with one macroseta, joined by narrow sternum, elongate along longitudinal body axis. Prefemur relatively long; prefemoral process extending well beyond distal extremity of prefemur and curving subparallel to acropodite, apically blunt, medial edge gently scalloped, lateral margin with strong, subacuminate, distal spine at midlength of extension. Acropodite much narrower than prefemur, curving gently ventrad, expanding moderately near midlength into broadly rounded, laminate and cupulate flange on outer margin, lateral surface with blunt spur near midlength, outer margin angling sharply ventrad, meeting gently curved inner margin in slightly prolonged, acuminate tip.

Male paratypes: The male paratypes agree closely with the holotype in all particulars.

Female paratype: Length 25.4 mm, maximum width 4.5 mm, W/L ratio 17.7%, D/W ratio 80.0%. Agreeing closely with males in somatic details with following exceptions: papillae more pronounced, subtuberculate, anterior row curving caudad laterally and extending onto bases of paranota; latter more strongly declined, creating appearance of more vaulted dorsum; 2nd coxae with elongate, caudally directed lobes (Figs. 12-13), 3rd coxae without projections; prefemoral spines curving gently, not uncinata. Receptacle (Fig. 14) relatively small, lightly hirsute. Valves large, subequal, rhomboidal, with dense mat of very long hairs.

Variation: Papillae on males from all localities are smaller, more rounded, and less conspicuous than on females. Averages of measurements of pinned specimens from Panorama Campground (LACMNH) are as follows: Males ($n = 24$) length 24.1 mm, maximum width 4.4 mm, W/L ratio 18.4%; females ($n = 5$), length 24 mm, maximum width 4.9 mm, W/L ratio 20.2%.

The gonopods are uniform with the most noticeable difference involving the number and sharpness of the teeth on the medial margin of the prefemoral process and the size of its

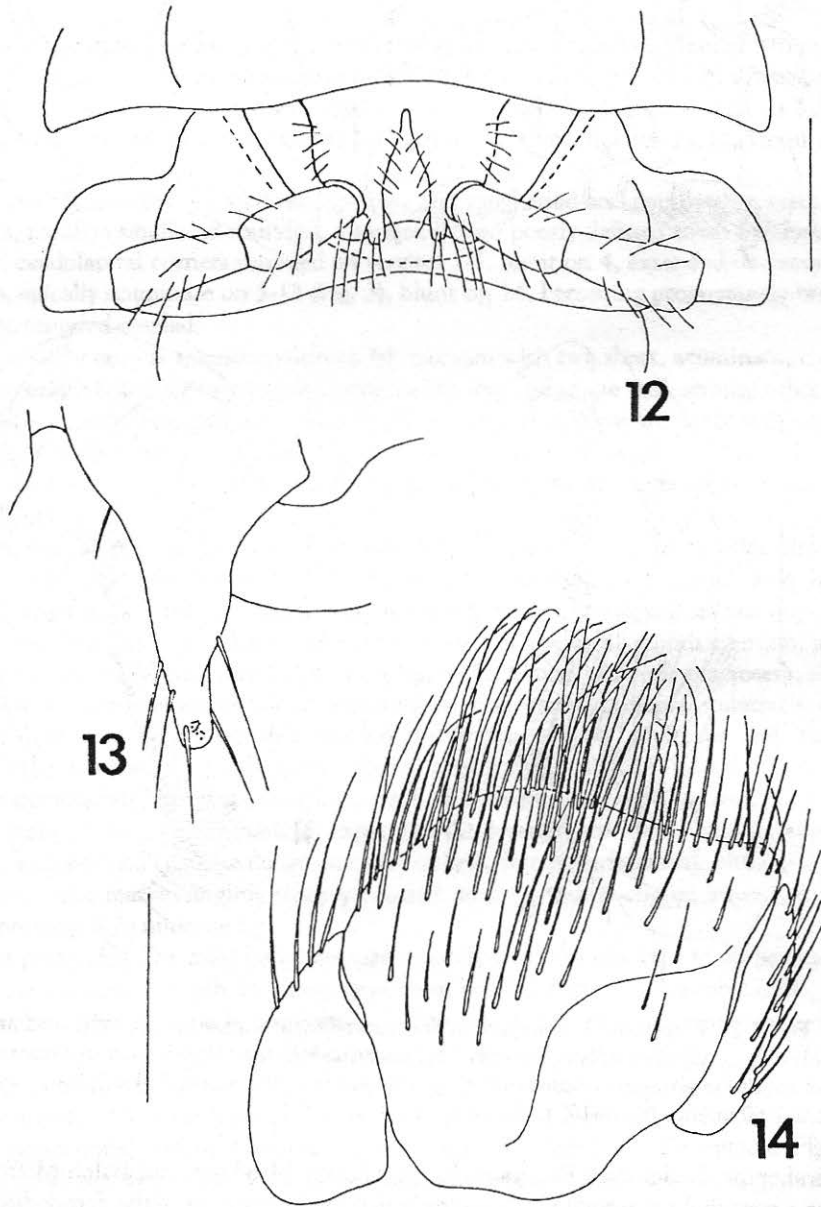


Figs. 7-11. *P. tiemanni*. 7, gonopods *in situ*, ventral view of paratype. 8, right coxa and sternum of holotype, dorsal view. 9, left gonopod of the same, medial view. 10, telopodite of the same, lateral view. 11, distal extremity of the same, caudal view. Scale line for fig. 7 = 1.00 mm; line for other figs. = 1.60 mm for figs. 8-10, 1.00 mm for fig. 11.

lateral spine. Males from Panorama Ridge, Quaker Meadows, and Balch Mountain Park have a very slight marginal tooth on the inner distal curvature of the acropodite.

Ecology: Specimens were collected from 6,000', at Redwood Meadows Campground, to 7,300', at Panorama Campground. The species are in the same general area and elevation as the southernmost of Giant Sequoias, but labels with the specimens provide no habitat information and do not indicate that any were taken specifically in these groves.

Distribution: Tulare County, California, south of Sequoia National Park, from Balch Mountain Park to Panorama Campground just north of the Kern County line, a distance of approximately 28 mi (44.8 km) (Fig. 2). Specimens were examined as follows:



Figs. 12-14. *P. tiemanni*. 12, 2nd coxae and cyphopodal aperture, of female paratype, ventral view. 13, lobe of left 2nd coxa of the same, ventral view. 14, left cyphopod of the same, caudal view. Scale line for fig. 12 = 1.00 mm; line for other figs. = 0.80 mm for fig. 13, 0.50 mm for fig. 14.

CALIFORNIA: *Tulare* Co., Balch Mtn. Pk., Mountain Home State For., 6,100', 5M, F, 3 June 1964, D. L. Tiemann (FSCA); Quaker Meadows, ca. 4 mi (6.4 km) SE Camp Nelson, 7,000', 20M, 15 June 1963, D. L. Tiemann (FSCA); Redwood Meadows Cpgd., ca. 11.2 mi (17.9 km) S Camp Nelson, 6,000-6,200', 16M, 2F, 1 June 1963, D. L. Tiemann (FSCA, NMNH, VMNH) and F, 16 June 1963, D. L. Tiemann (FSCA) TYPE LOCALITY; Cold Springs Saddle, ca. 13.8 mi (22.1 km) SSW Camp Nelson (ca. 3.8 mi (6.1 km) NNE California Hot Springs), 2M, 1 June 1963, D. L. Tiemann (FSCA); Panorama Ridge, ca. 6.2 mi (9.9 km) SE California Hot Springs, 7,100', M, 1965, D. L. Tiemann (FSCA); and Panorama Campground, ca. 7.1 mi (11.4 km) SSE California Hot Springs, 7,300', 13M, 2F, 13 June 1964, D. L. Tiemann (LACMNH) and 26M, 3F, 15 June 1965, D. L. Tiemann (FSCA, LACMNH).

Remarks: The southernmost representative, this species is named for Darwin L. Tiemann, who collected all the specimens, all but two samples of *Parcipromus*, and more Sierran xystodesmid millipeds than anyone before or since. His field work in the Sierras in 1963-64, to study distributions in the genus *Motyxia*, was supported by a grant from the Penrose Fund of the American Philosophical Society. Tiemann (1963) reported the existence of this species in a brief report on his grant activities, when he mentioned that a new, nonluminous species was collected in addition to the *Motyxias*. He indicated that it represented a new genus and that it fluoresced brightly under ultraviolet light. He gave some specimens to Nell B. Causey, who preserved them in alcohol; her milliped collection, which contained these specimens, was transferred to the FSCA after her death. Tiemann also coated some dry specimens with shellac or a similar substance and place them on insect pins. They are now at the LACMNH, where they comprise part of the world's largest pinned milliped collection (Shelley, in press).

Parcipromus gigantoarboricolus, new species

Figs. 15-18

Type specimens: Male holotype and 7 male paratypes (FSCA, LACMNH) collected by D. L. Tiemann, 2 June 1964, along General's Highway at southern edge of Giant Forest (elevation 5,600'), Sequoia National Park, Tulare County, California. The LACMNH specimens comprise part of their pinned milliped collection. One "wet" paratype deposited in both VMNH and NMNH.

Diagnosis: Stem of prefemoral process terminating abruptly at level of distal extremity of prefemur, lateral spiniform projection long, continuing distad beyond prefemur, detached from stem of process and appearing as separate, femoral projection; acropodite with outer margin expanding into broadly rounded flange.

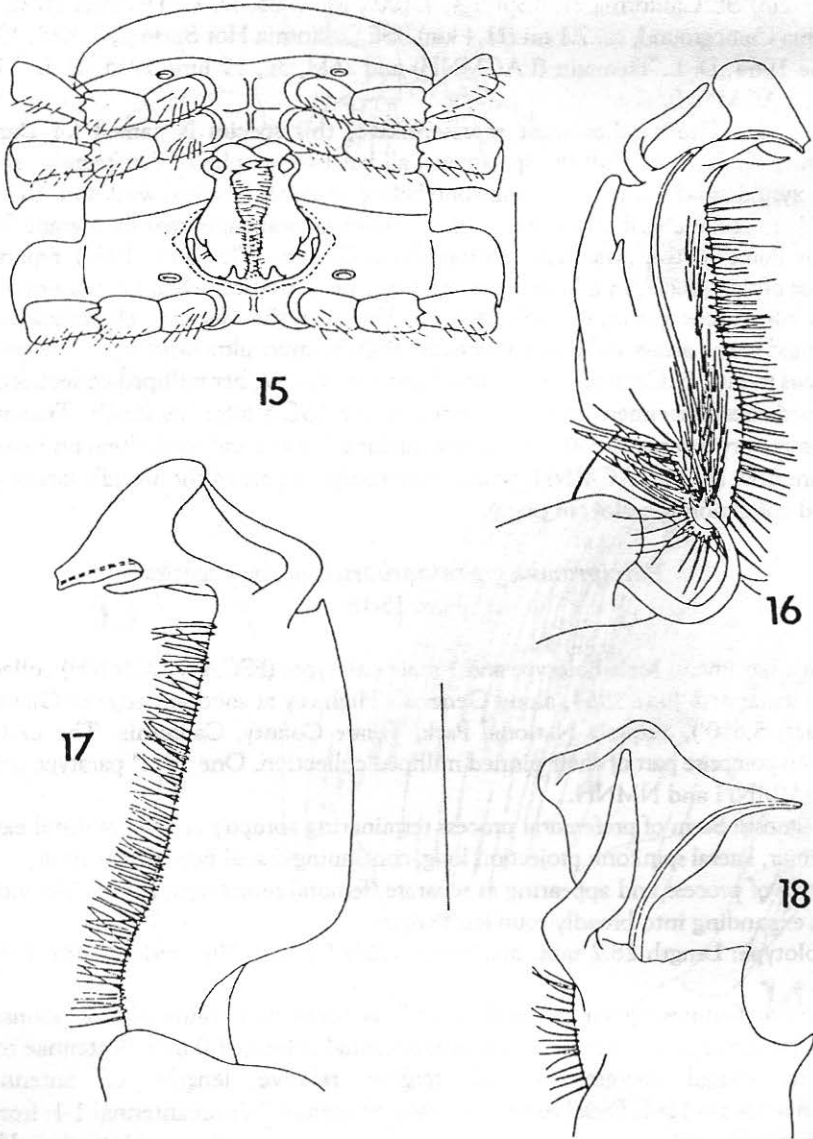
Holotype: Length 28.2 mm, maximum width 5.2 mm, W/L ratio 18.4%, D/W ratio 67.3%.

Somatic features agreeing with those of *P. tiemanni*, with following exceptions:

Width across genal apices 3.1 mm, interantennal isthmus 1.0 mm. Antennae reaching back to caudal margin of 3rd tergite; relative lengths of antennomeres 2 > 3 > 6 > 4 > 5 > 1 > 7. Facial setae as follows: epicranial 2-2; subantennal 1-1; frontal 3-3 in three separate pairs, setae of each pair becoming progressively more interspaced basally; genal 4-4, subcontinuous with frontal series; clypeal about 15-15; labral about 22-22, merging with clypeal series and continuing beyond midlength of genal borders, about 12 setae per side.

Dorsum smooth and granular on segments 1-3, becoming roughened in appearance on segment 4, papillate on 5-6, and progressively more papillose to subtuberculate caudad,

papillae large and subconical, covering both pro- and metazona, arranged generally in three sublateral rows, about 16-18 papillae per row, with scattered intermittent papillae. Paranota not or indistinctly papillate; caudolateral corners rounded on tergites 1-3, blunt on 4, and extended on remaining segments, apically acuminate on 5-12, blunt on 13, becoming progressively broader and more rounded caudad.



Figs. 15-18. *P. gigantearboricolus*. 15, gonopods *in situ*, ventral view of paratype. 16, left gonopod of holotype, medial view. 17, telopodite of the same, lateral view. 18, distal extremity of the same, caudal view. Scale line for fig. 15 = 1.00 mm; line for other figs. = 0.60 mm for fig. 16, 0.83 mm for fig. 17, 1.00 mm for fig. 18.

Sides of metazonites smooth, subgranular. 4th sternum unmodified.

Gonopodal aperture 1.6 mm wide and 0.9 mm long at midpoint, sides elevated moderately to midlength then strongly to caudolateral corners, dropping slightly in caudal midline, caudal margin and sides thickened beyond midlength of latter, caudal margin and caudolateral corners flared. Gonopods *in situ* (Fig. 15, of paratype) with telopodites overhanging anterior margin of aperture and 6th sternum, apices overlapping. Gonopod structure as follows (Figs. 16-18): Prefemur relatively long; prefemoral process terminating abruptly at distal extremity of prefemur, with short tooth on medial edge near midlength, lateral spine extending distad alone, thereby appearing as separate femoral projection detached from prefemoral process, bent strongly ventrad near 1/4 length, narrowing smoothly and continuously to blunt tip. Acropodite stem bending strongly ventrad basally, expanding greatly beyond distal extremity of lateral prefemoral spine into broadly rounded, laminate, cupulate flange on outer margin, lateral surface with strong subacuminate spur near midlength, outer margin angling ventrad, terminating short of inner edge, thereby forming blunt tip with slightly extended corners.

Male paratypes: The male paratypes agree closely with the holotype in all particulars.

Variation: Aside from slight differences in the length of the femoral process and the degree of marginal irregularity of the prefemoral process, there is little gonopodal variation among the specimens of *P. gigantearboricolus*. A pinned, intact male from Giant Forest (LACMNH) measured 27.1 mm in length, 4.9 mm in width, W/L ratio = 18.1%.

Ecology: The vial labels do not indicate habitat, but as indicated by the specific name, *P. gigantearboricolus* inhabits the sequoia groves themselves, the only xystodesmid known to occur in association with *Sequoiadendron giganteum*. Specimens were found in the Giant Forest, the largest grove of Sequoias, near the General Sherman tree and along the Congress trail, as well as at slightly lower elevations along General's Highway, the main park road.

Distribution: Known only from Giant Forest and vicinity, Sequoia National Park, Tulare County (Fig. 2). Specimens were examined as follows:

CALIFORNIA: Tulare Co., Sequoia Natl. Pk., Giant For., 6,350', 18M, 2 June 1964, D. L. Tiemann (FSCA, LACMNH), start of Congress Trail, nr. Gen. Sherman tree, M, 13 August 1972, F. A. Coyle (NCSM), and lower edge of Giant For., 5,600', 9M, 12 June 1964, D. L. Tiemann (FSCA, LACMNH, NMNH, VMNH) TYPE LOCALITY; along General's Hwy., 5,100', 2M, 2 June 1964, D. L. Tiemann (FSCA); 20 km (12.5 mi) above Pk. HQ at Ash Mountain, along General's Hwy. at Slide Spg., 5,000', 2M, date unknown, D. L. Tiemann (FSCA); and 13.4 km (8.4 mi) above Pk. HQ., along General's Hwy., 3,520', 2M, date unknown, D. L. Tiemann (FSCA).

Remarks: No females of *P. gigantearboricolus* have been collected, so the cyphopod structure is unknown.

Parcipromus cooki (Causey), new combination

Figs. 19-27

Xystocheir cooki Causey, 1955:91, fig. 3. Chamberlin & Hoffman, 1958:54. Buckett, 1964:10.

Type specimens: Lost. According to Causey (1955), the original type series contained two males and one female; the male holotype was supposedly deposited in the American Museum of Natural History, New York, but there is no record of its ever having been shipped. The male and female paratypes were retained in Dr. Causey's personal collection, but repeated searches through these holdings in the FSCA have failed to locate them.

Neotype designation is therefore desirable to stabilize this name. Male neotype and 1 male and 1 female paraneotypes (CAS) taken by unknown collector in July 1910 at an unknown site in Kings River Canyon, Fresno County, California.

Diagnosis: Prefemoral process continuing distad beyond distal extremity of prefemur, curving subparallel to, and narrowly segregated from, acropodite, lateral spiniform projection absent; acropodite narrowly blade-like throughout length, sides subparallel, outer margin not expanded.

Neotype: Body highly fragmented, length unmeasurable, maximum width 4.1 mm, D/W ratio 80.5%.

Somatic features agreeing with those of *P. tiemanni*, with following exceptions:

Epicranial suture faint. Width across genal apices 2.1 mm, interantennal isthmus 1.2 mm. Relative lengths of antennomeres $3 > 2 > 6 > 4 > 5 > 1 > 7$. Genae with faint central impressions. Facial setae largely absent and presumed lost, characterized for nontypical male under variation.

Dorsal papillae slightly larger and more distinct, arranged in three rows.

Pregonopodal segments with slight supracoxal knobs. Prefemoral spines less uncinata caudally.

Gonopodal aperture 1.5 mm wide and 0.8 mm long at midpoint, sides elevating smoothly and continuously to caudolateral corners, curving onto caudal margin and dropping slightly in midline, caudal margin and caudolateral corners slightly flared. Gonopods *in situ* (Fig. 19) with telopodites overhanging anterior margin of aperture and 6th segment, apices of acropodites overlapping broadly. Gonopod structure as follows (Figs. 20-22): Prefemur relatively short and broad; prefemoral process extending well beyond distal extremity of prefemur for about half the length of acropodite, narrowly segregated from, and curving subparallel to, latter, narrowing smoothly and continuously to acuminate tip, with broad, triangular projection from medial margin just distal to prefemur, left gonopod with spur distal to projection (spur absent from right gonopod), lateral spine absent from both gonopods. Acropodite broad, blade-like throughout length, curving strongly ventrad, outer margin not expanded, sides subparallel, narrowing slightly to blunt, two-pronged tip with inner corner slightly extended, with long, apically rounded, spiniform projection from lateral margin near midlength, curving ventrad, length subequal to distal half of acropodite stem.

Male paraneotype: The male paratype, also highly fragmented, agrees closely with the holotype in all particulars.

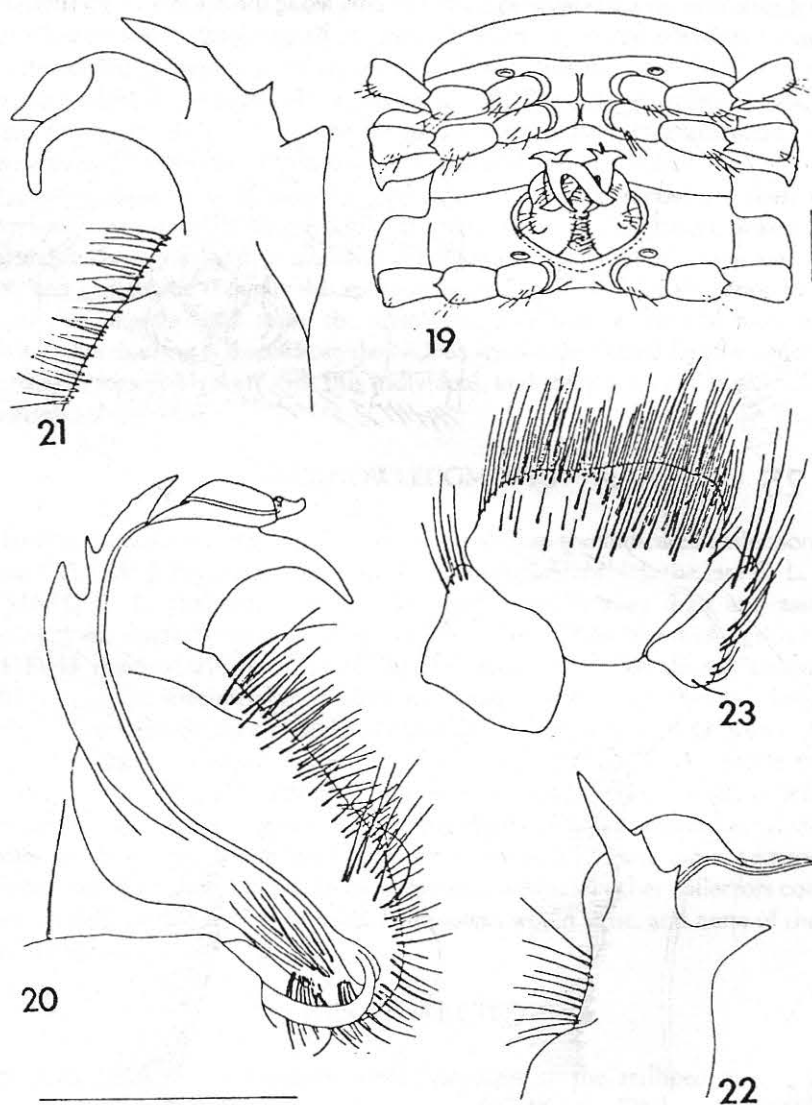
Female paraneotype: Body highly fragmented, length unmeasurable, maximum width 4.1 mm, D/W ratio 82.9%. Agreeing essentially with males in somatic features with following exceptions: papillae more pronounced, clearly extending onto bases of paranota; latter more strongly declined, creating appearance of more vaulted dorsum. Receptacle (Fig. 23) moderate-size, with a few hairs arising from ventral tip. Valves moderate-size subquadrate and subequal, with dense mat of very long hairs arising from anterior and caudal surfaces and ventral edge.

Variation: Length 18.8 mm, maximum width 3.4 mm, W/L ratio 18.1%, D/W ratio 73.5%. Facial setae as follows: epicranial 2-2, subantennal 1-1, frontal 2-2, genal 2-2, clypeal about 12-12, labral about 18-18.

Average measurements of six pinned males from Tulare County (LACMNH) were length 26.9 mm, maximum width 4.8 mm, W/L ratio 17.8%.

The Fresno County male is distinctly and strongly papillate, much more so than the neotype, as it has strong, subconical papillae arranged in 3 distinct rows extending onto the bases of the paranota. However, the Tulare County males are smooth and polished, with faint papillae that are distinguishable only on the caudalmost tergites. On the gonopods the

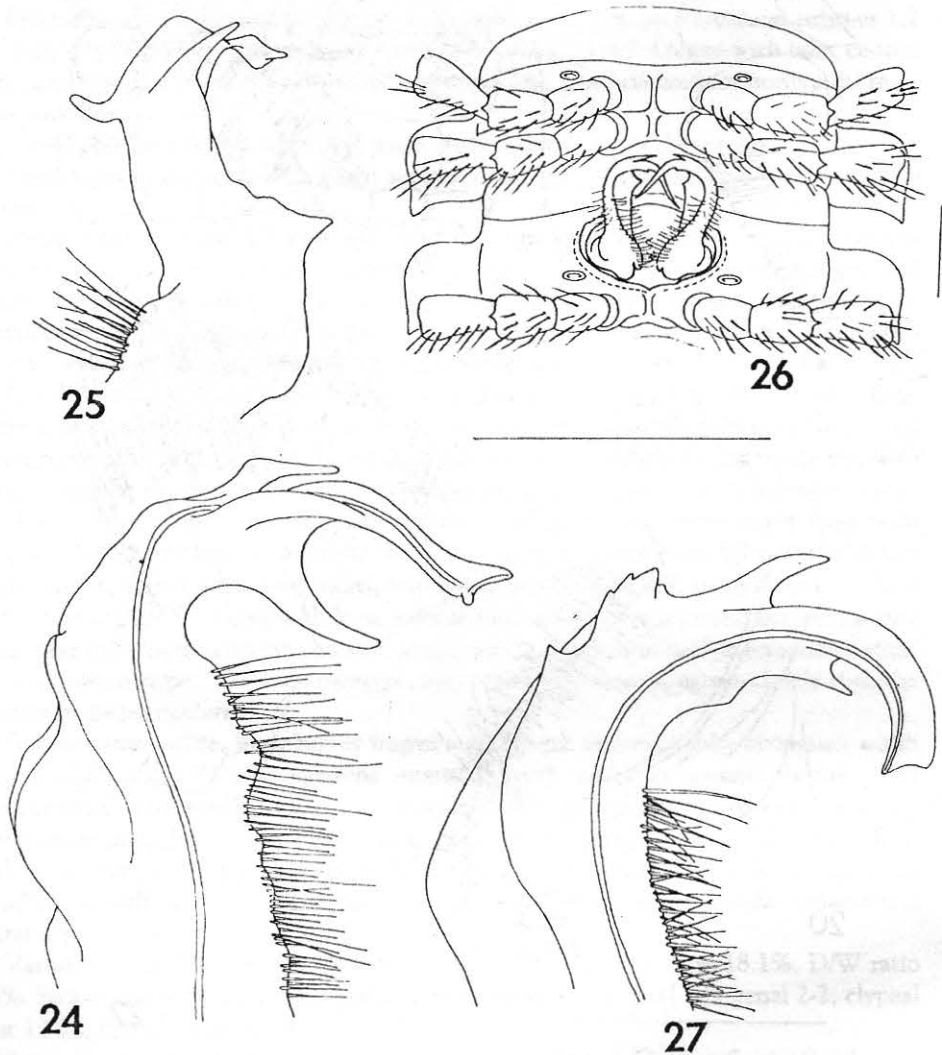
prefemur of the Fresno County male has a distal ridge on the medial margin. Its prefemoral process, shorter than in the types, has a strong basal spine and swelling, but the lateral acropodal spine is much shorter than in the types (Figs. 24-25). The prefemur of the Tulare County males lacks the distomedial ridge, and its prefemoral process, also shorter than in the types, has a moderate-size basal swelling. The lateral acropodal spine is still shorter, but the acropodite is much longer than those in either other sample (Figs. 26-27).



Figs. 19-23. *P. cooki*. 19, reconstruction of gonopods *in situ*, ventral view of holotype. 20, left gonopod of neotype, medial view. 21, telopodite of the same, lateral view. 22, distal extremity of the same, caudal view. 23, left cyphopod of female paratype, caudal view. Scale line for fig. 19 = 1.00 mm; line for other figs. = 0.75 mm for fig. 20, 0.94 mm for fig. 22, 1.00 mm for figs. 21 and 23.

Ecology: The Sequoia Lake male was found on the ground under a piece of pine wood in a mixed pine/fir forest. The weather was cool and patches of snow were still evident. The Tulare males were found at a much lower elevation, 3315 ft.

Distribution: Known from Kings River Canyon in southeastern Fresno County, probably along the borders of the Sierra and Sequoia National Forests, to just outside the southern section of Sequoia National Park, Tulare County, a distance of about 38 mi (60.8 km) (Fig. 2). The species doubtlessly inhabits the Grant Grove area of Kings Canyon National Park. The type locality is in Tulare County along the Silliman Gap trail, Redwood Canyon, in the Redwood Mountain Section of Kings Canyon National Park, which



Figs. 24-27. *P. cooki*. 24, telopodite of left gonopod of male from Sequoia Lake, Fresno County, medial view. 25, distal extremity of the same, caudal view. 26, gonopods *in situ* of male from 8.5 mi (13.6 km) E Hammond, Tulare County. 27, telopodite of left gonopod of the same, medial view. Scale line for fig. 26 = 1.00 mm; line for other figs. = 1.60 mm for fig. 25, 1.00 mm for figs. 24 and 27.

Causey (1955) erroneously placed in Sequoia National Park. Specimens were examined as follows:

CALIFORNIA: Fresno Co., Kings River Canyon, exact site unknown, 2M, F, July 1910, collector unknown (CAS) NEOTYPE LOCALITY; and Sequoia Lake, 5,500', M, 4 May 1991, N. J. Smith (NCSM). Tulare Co., 8.5 mi (13.6 km) E Hammond, probably along Mineral King rd. nr. border of Sequoia Natl. Pk., 3,315, 7M, 26 March 1967, D. L. Tiemann (LACMNH).

Remarks: The neotype is one of the few male xystodesmids exhibiting internal variation. The left and right gonopods differ in that the former (Figs. 20-22) possesses a spur distal to the medial projection of the prefemoral process while the latter lacks this spur; this difference is evident in the *in situ* arrangement (Fig. 19). The right acropodite is also broken and hence much shorter than that of the left gonopod; figure 19 is a reconstruction showing how the gonopods are believed to appear without breakage.

The name, *Xystocheir cooki*, has been enigmatic since it was proposed, as there were no specimens to compare with Causey's (1955) single gonopod illustration, drawn from an unusual angle. I have puzzled over the name since I began studying California xystodesmids in 1984, and I originally thought this species was undescribed. Causey's gonopod figure is closest to the Sequoia Lake male, the most proximate sample, but the most proximal projection in her drawing is absent from the NCSM specimen. Excluding this structure, her drawing agrees reasonably well with this individual, and there is no doubt that the name, *cooki*, refers to this species.

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