

II. EPHEMEROPTERA NYMPHS

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During June and July, 1977, Dr. S. S. Roback collected a series of mayfly nymphs from small streams in the region of Lake Titicaca in Peru and Bolivia. He asked me to attempt to identify them and, if desirable, provide appropriate descriptions. The collections consisted almost exclusively of nymphs, predominantly in the genus *Baetis*. As the mayflies of South America are still not well known, I have, therefore, decided to give brief descriptions with selected structures illustrated with photographs so that when more detailed studies are undertaken, some information will be available about those species inhabiting the region.

FAMILY BAETIDAE
Genus *Baetis* Leach*Baetis peruvianus* Ulmer, Figs. 1-11*Baetis peruvianus* Ulmer 1920: 53, 54.

The nymphs I am assigning to this species resemble the description given by Needham and Murphy (1924) of the presumed immature of *B. peruvianus*. A single, poorly preserved female adult possessed hind wings which I was able to study and photograph (Fig. 6). The venation of the metathoracic wing strongly resembles the illustration of the male wing given by Ulmer (1920) in his description of *peruvianus*. I have had Ulmer's drawing copied and enlarged for comparison (Fig. 5). The venation of the mesothoracic wing is typical of that of other females of the genus.

The presence of nymphs of this species in this region is not surprising inasmuch as two males of Dr. Ulmer's type series were collected at Guaqui, Lake Titicaca, Peru. Dr. Roback's collections are all from the general area of the lake and from altitudes

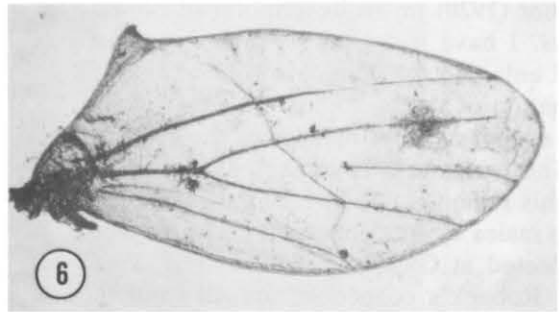
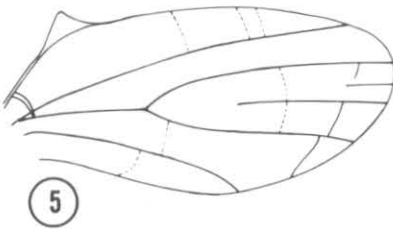
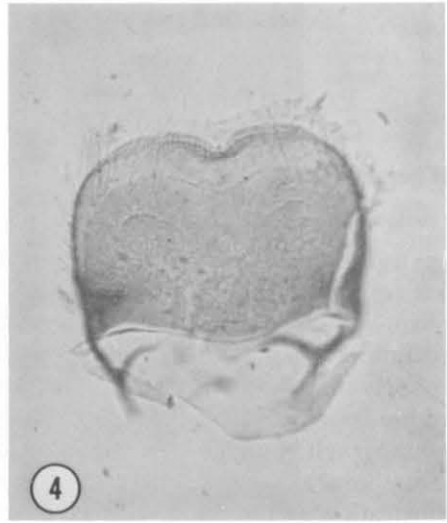
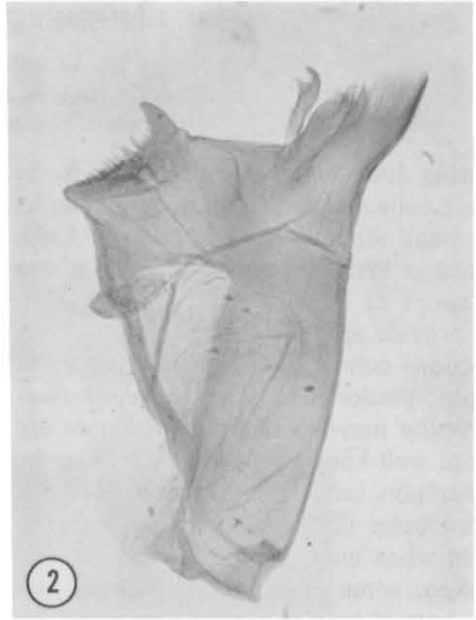
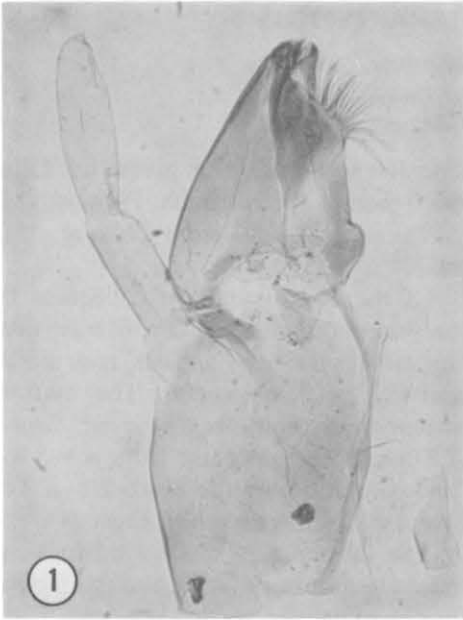
consistent with those given by Ulmer—3000 meters at Urubamba, Peru—and those of Demoulin (1955) from Chile at altitudes of 798 and 3900 meters.

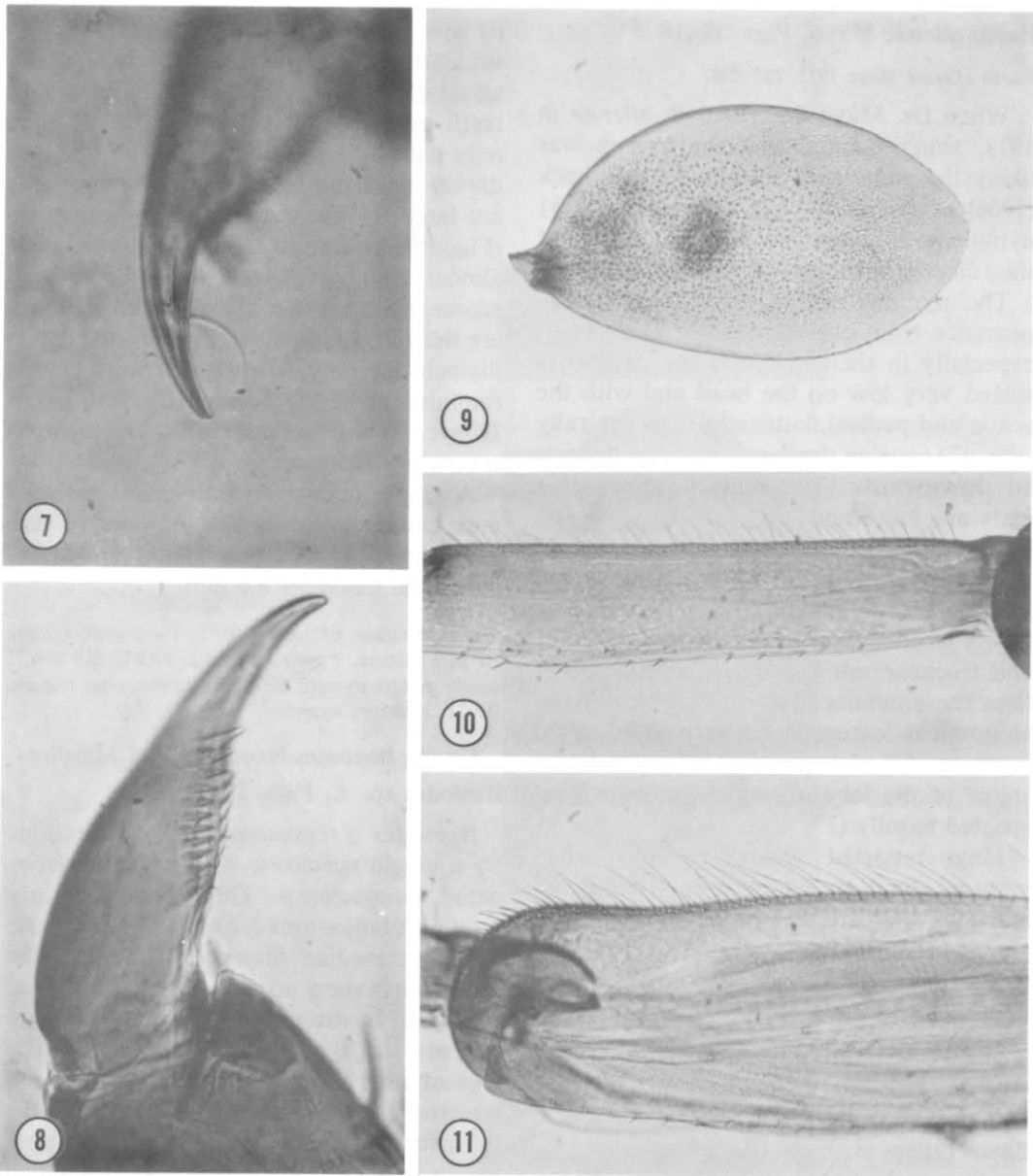
Of the 112 nymphs in collection BP 4, only 6 are males, none of which are mature, suggesting that the species may be facultatively parthenogenetic. The mature females have a body length ranging from 6.1–7.8 mm; cerci measure from 4.5–5.4 mm; and the median filament 2.5–3.3 mm. Mouthparts are shown in Figs. 1–4.

The labrum has 18–24 long bristles behind the anterior margin and the labial palp has an expanded second segment. The femora are fringed with long hairs on the dorsal margin and the tibiae are also bordered with a fringe of setae that are shorter than those of the femora (Figs. 10–11). The inner edge of the tibiae has short, stout setae and the tarsal claws bear 10–12 stout denticles as well as a pair of fine, long, recurved bristles near the tip (Figs. 7–8). The abdomen lacks distinctive markings. The gills are colorless and are without obvious tracheae but the gill margin is strongly chitinized medially and laterally so that each is clearly outlined (Fig. 9). Caudal filaments are unicolorous with the median filament varying from about half (or less in younger nymphs) to about three-fourths the length of the cerci.

A variant of the above form was found in collections BP 4 and BP 20. The gills of these nymphs are rust colored through most of their central area and the tracheae are faintly visible in some.

COLLECTIONS. BOLIVIA: BP 4, 112 nymphs, including 19 mature females, 1 male; BP 5, 2 half-grown nymphs, 3 nymphal exuviae; BP 10, 1 mature female nymph; 1 minute specimen. PERU: BP 20, 35 nymphs, 2 nymphal exuviae, 1 female adult; BP 21, 40 nymphs, more than half are mature specimens; BP 23, 37 nymphs and 4 nymphal exuviae; BP 26, 33 nymphs.





FIGS. 7-11. *Baetis peruvianus* Ulmer; 7. Tip of claw to show bristles; 8. Claw; 9. 4th gill; 10-11. Metathoracic leg; 10. Tibia; 11. Femur.

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FIGS. 1-6. *Baetis peruvianus* Ulmer; 1. Maxilla; 2. Right mandible; 3. Labial palp; 4. Labrum; 5. Metathoracic wing of male redrawn from Ulmer 1919; 6. Metathoracic wing of female adult.

Baetis ellenae Mayo, Figs. 12–18

Baetis ellenae Mayo 1973: 285–288.

When Dr. Mayo described *B. ellenae* in 1973, she remarked that the nymph was likely the same one described by Roback (1966) as *Baetis* sp. 1. Of the series of 31 nymphs available to me, none is mature but they clearly fit the description given by her.

The nymphs are quite different in appearance from other species of the genus, especially in their antennae which are inserted very low on the head and with the scape and pedicel flattened dorso-ventrally (Fig. 12) causing the flagellum to be deflected downwards. The metathoracic wing pads are large and the body is pale. The strongly denticulate claws also possess a strongly recurved seta originating near the base of the outer denticles and extending nearly to the tip of the claw (Figs. 14–15). Gill tracheae are lightly pigmented. Other than the antennae, the most characteristic anatomical features are the inflated distal segment of the labial palps (Fig. 13) and the shape of the labrum, which is much constricted basally (Fig. 16).

Mayo reported that the nymphs, when mature, climb out of the water onto rocks and logs that are wet by spray. She also claimed that the nymphs are the most common of all species of the genus in the Macuchi region of Ecuador.

COLLECTION. PERU: BP 22B, 31 nymphs, none mature.

Baetis (?) sp. B, Figs. 19–22

I am assigning these nymphs questionably to the genus *Baetis*; however, their final placement will depend on identification of reared adults that are not presently available. The nymphs would be identifiable readily as *Baetis* were it not for the length of the median caudal filament, which is the same as that of the laterals, and the virtual lack of denticles on the claws (Fig. 21).

The mouthparts are fairly typical of *Bae-*

tis nymphs and the metathoracic wing pad is clearly evident in mature specimens. The tarsal claws are elongate and have minute teeth near the base but they can be seen only with high magnification. The tarsi are darker than the other leg segments. Gills are large, elongate, and strongly tracheate (Fig. 19). The three caudal filaments are of almost equal thickness, with the median scarcely shorter than the laterals. The cerci are densely setate medially and the median filament laterally. The setal arrangement is reminiscent of the North American genus *Isonychia* and indicates that the nymphs are strong swimmers.

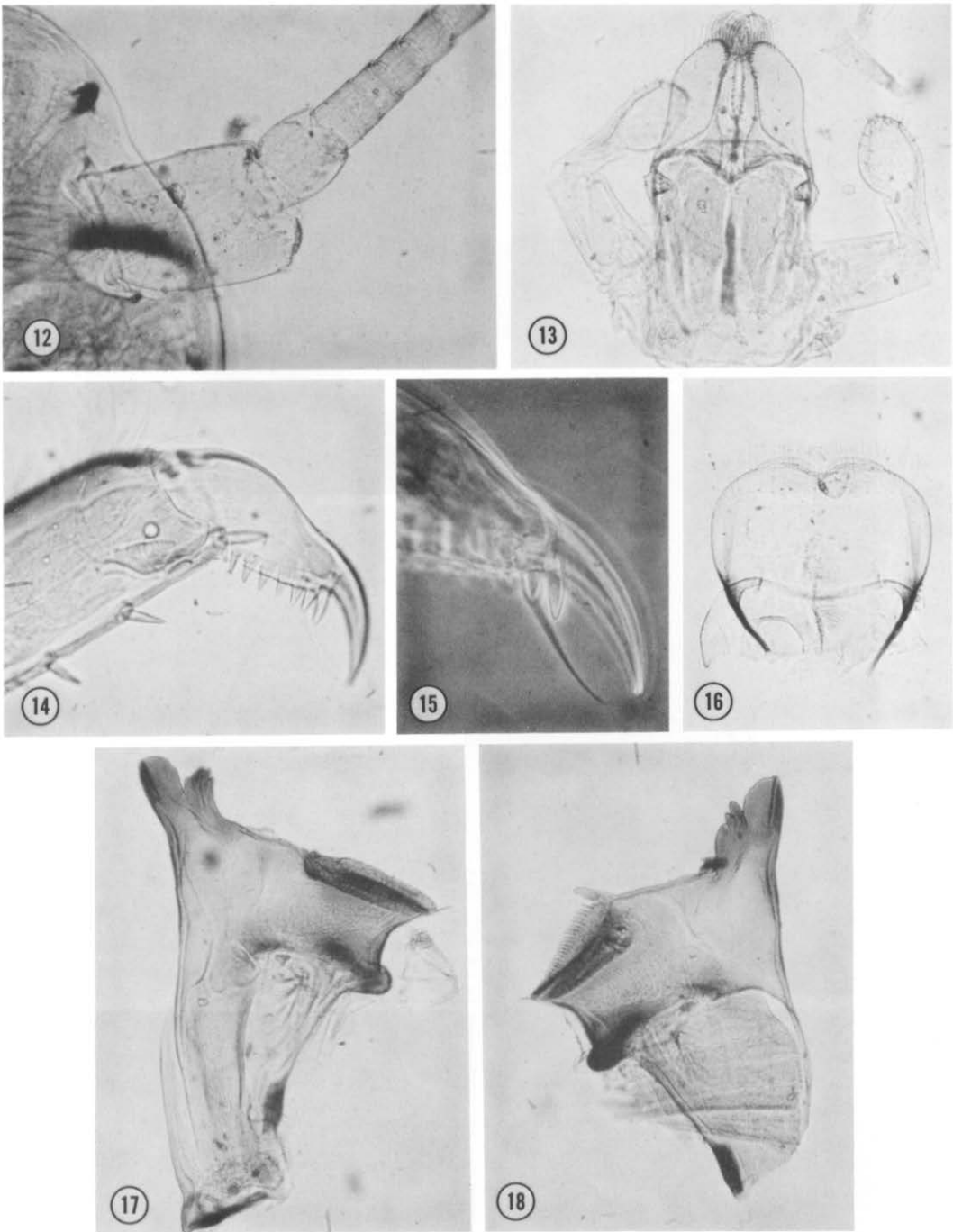
A single mature nymph measured 10.1 mm; caudal filaments broken; another broken specimen was approximately 9 mm and its caudal filaments 4.8 mm.

COLLECTIONS. BOLIVIA: BP 5, 1 immature nymph; BP 8, 1 mature, 2 young nymphs. PERU: BP 16A, 1 nearly mature nymph; BP 20, 3 nymphs, none mature; BP 21, 1 mature nymph.

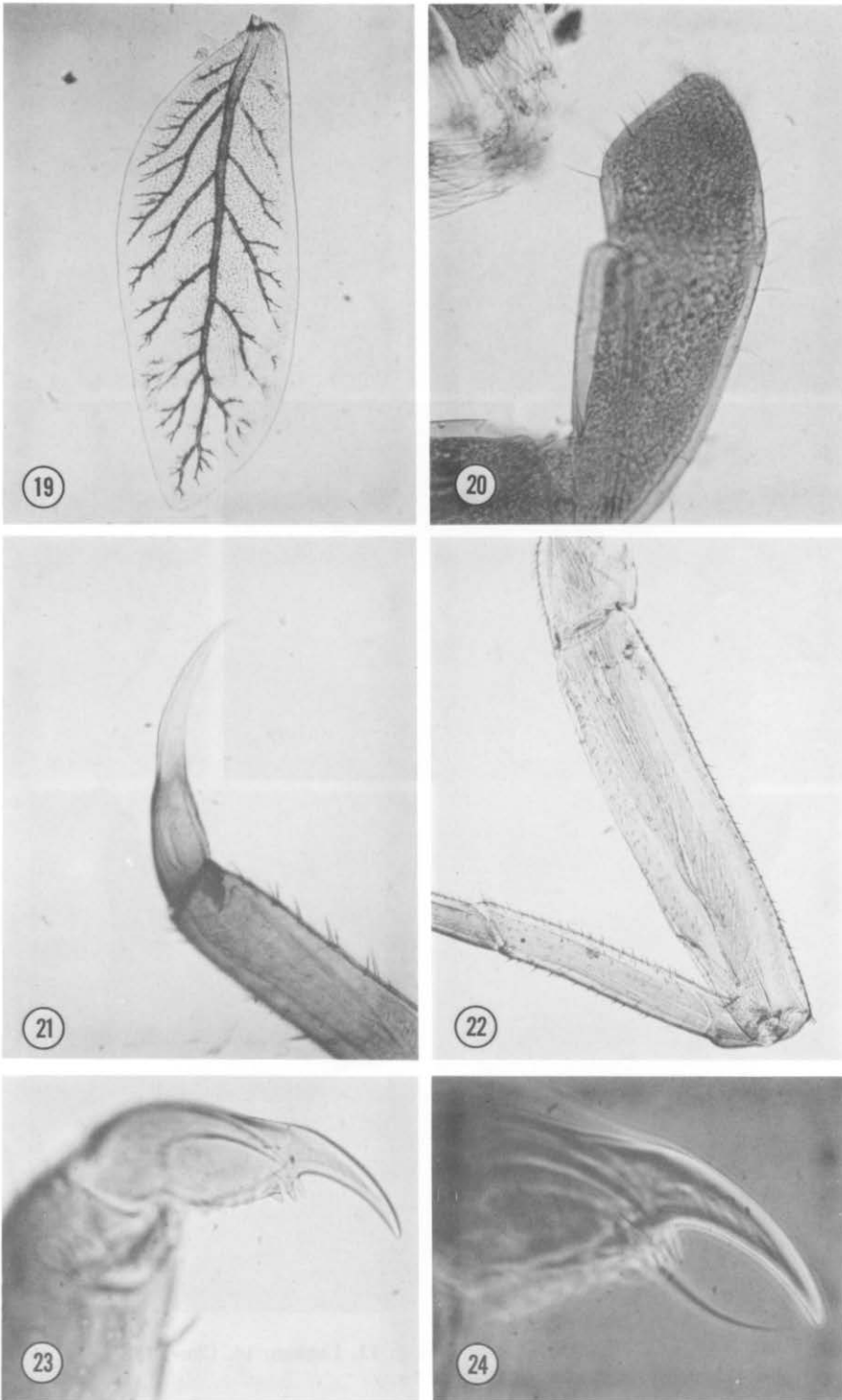
Genus Baetodes Needham and Murphy
Baetodes sp. A, Figs. 23–24

Baetodes is represented in the collections by a single specimen which I have designated as species A. The nymph is nearly grown and measures 3.2 mm in length; cerci 2.8 mm; median filament 0.24 mm. The mouthparts show no unique characteristics. The head is strongly hypognathous. Coxal gills are small, single and unbranched. The legs are long and thin and have coxae which are strongly flared laterally. The claws have the usual denticles (Fig. 23) but also possess a recurved bristle (Fig. 24) originating near the base of the distal teeth and extending nearly to the tip of the claw like that of some other species from South America described by Mayo (1968, 1972). The gills are whitish and the tracheae are not pigmented. Conspicuous posteromedial elevated projections are present on the metanotum and on abdominal tergites 1–9.

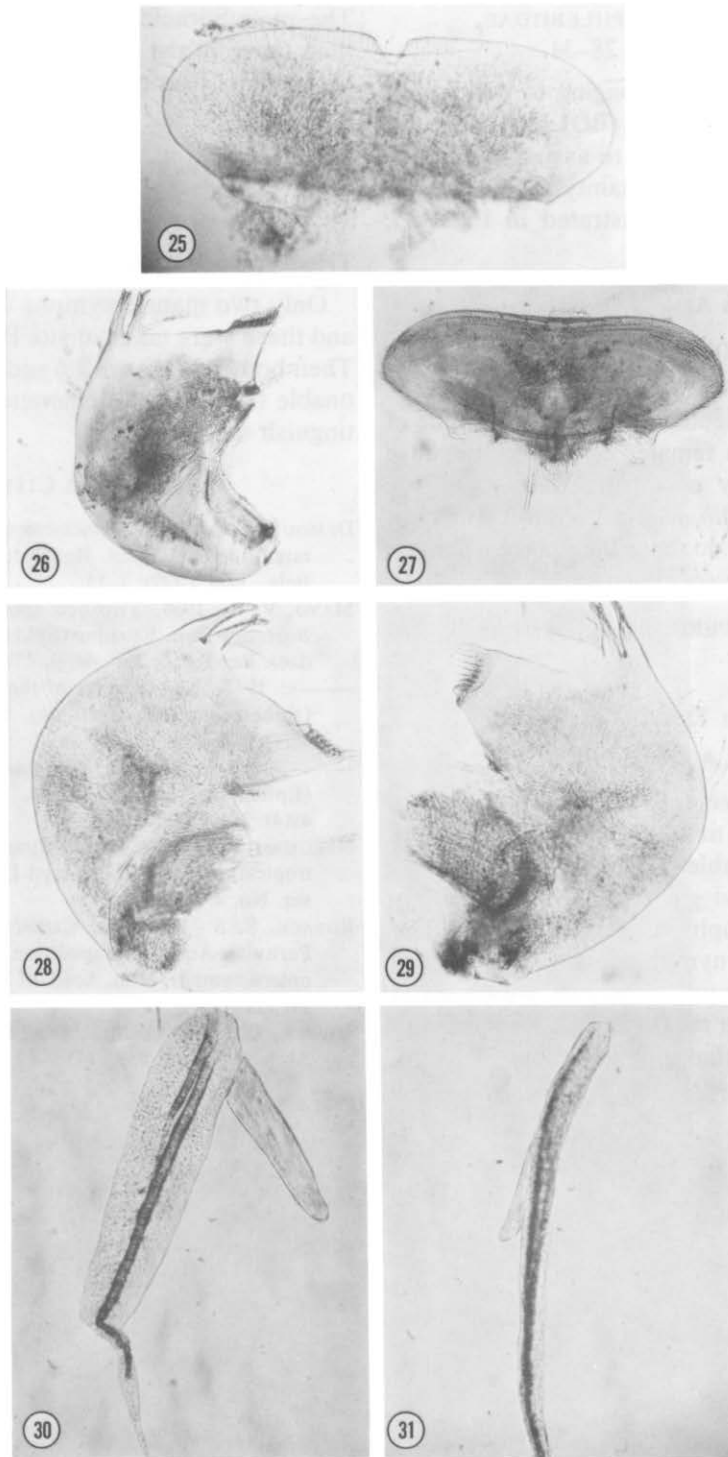
COLLECTION. PERU: BP 26, 1 nymph.



FIGS. 12-18. *Baetis ellenae* Mayo; 12. Antennal base; 13. Labium; 14. Claw; 15. Tip of claw to show recurved bristle; 16. Labrum; 17. Left and right mandibles.



FIGS. 19-24. *Baetis* (?) sp. B, Figs. 19-22; 19. 4th gill; 20. Labial palp; 21. Tarsal claw; 22. Femur and tibia; *Baetodes* sp. A, Figs. 23-24; 23. Claw; 24. Tip of claw with bristle.



FIGS. 25-31. *Thraulodes* sp. A., Figs. 26-27; 26. Left mandible; 27. Labrum; Leptophlebiidae, Figs. 25, 28-31; 25. Labrum; 28-29. Left and right mandibles; 30. 6th gill; 31. 2nd gill.

FAMILY LEPTOPHLEBIIDAE,
FIGS. 25, 28-31

A single nymph belonging to this family was taken at site BP 4 (BOLIVIA) but the specimen is too young to assign to a genus with any degree of certainty. Some mouthparts and gills are illustrated in Figs. 25, 28-31.

Genus *Atalophlebia* Eaton

Atalophlebia sp. A

The species is represented by only three specimens collected at two stations. One of the nymphs, a female, is mature. Because of the paucity of information about the nymphs of *Atalophlebia* in South America, I am unable to do more than place a generic name on these specimens.

COLLECTIONS. PERU: BP 20, 1 nymph; BP 23, 2 nymphs, 1 mature.

Genus *Thraulodes* Ulmer

Thraulodes sp. A, Figs. 26-27

Nymphs were collected at only a single location. At first glance, the nymphs strongly resemble heptageniids; however, mouthparts and gill structure immediately place the nymphs as leptophlebiids. The single mature nymph measures 10 mm in body length; caudal filaments are coiled at the tips making measurement very difficult but I estimate that they are about 11.5 mm.

The metathoracic femora are much larger than those of the anterior legs and the median caudal filament is longer than the cerci.

COLLECTION. PERU: BP 26, 7 nymphs, one mature.

FAMILY TRICORYTHODIDAE

Tricorythodes sp. A

Only two mature nymphs were collected and these were taken at site BP 26 (PERU). Their body lengths are 2.6 and 2.9 mm. I was unable to find useful characteristics to distinguish the specimens.

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