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A NEW SPECIES OF *LEVITINIA* CHUBAREVA AND PETROVA (DIPTERA, SIMULIIDAE) FROM THE GOLAN HEIGHTS, ISRAEL[1]

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SUMMARY. Adults, larvae and pupae of *Levitinia freidbergi* n. sp. are described from a tiny winter stream at Merom Golan in the Golan Heigths. The relation of the new species to *L. tacobi* and to the primitive genera of *Prosimuliini* is discussed.

Key-words: Diptera. Simuliidae. *Levitinia freidbergi* n. sp. Golan Heights.

Une nouvelle espèce de *Levitinia* Chubareva et Petrova (Diptera, Simuliidae) d'Israël.

RÉSUMÉ. Le genre *Levitinia* dont les stades imaginaux sont décrits ici pour la première fois montre, chez les adultes, des caractères évoquant le genre *Prosimulium* tandis qu'à l'état larvaire il est très proche de *Gymnopais* et *Twinnia*. Tous les stades de *L. freidbergi* n. sp. sont décrits. Une étude comparative est faite avec les genres primitifs de *Prosimuliini* et la seule autre espèce connue du genre : *L. tacobi* Chubareva et Petrova, 1981.

Mots-clés : Diptères. Simuliidae. *Levitinia freidbergi* n. sp. Golan Heights.

Introduction

A new simulid species belonging to the genus *Levitinia* Chubareva and Petrova, 1981, has been collected in a survey at the Golan Heights, Israel. The samples, taken in March, 1981 and March, 1982, included a relatively abundant material of larvae, pupae and adults both sexes.

This species shows morphological characteristics related to the genus *Levitinia* a monotypic genus, known only from the larva of *L. tacobi*.

With the exception of *Prosimulium (P.) petrosum* Rubtsov, recorded in

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1. This work was carried out within the framework of French-Israeli collaboration treaty on the fauna of *Simuliidae* in Israel, signed in 1981 between the Department of Zoology of Tel-Aviv University (Prof. J. Kugler) and the Laboratory of Applied Parasitology and Zoology of Medicine and Pharmacy of University of Rennes (Prof. J. M. Doby).

Lebanon (Crosskey, 1967), the *Prosimuliini* (and particularly the primitive genera) were unknown in this region. However, the Golan Heights present biotops with high altitude and low temperature which provide the adequate climatic requirements for these groups.

Levitinia freidbergi n. sp.

MALE

Length 3 mm; generally blackish body, especially on scutum, with tendency to greyishness elsewhere; erected setae of clypeus, occiput, scutum and scutellum black at base and yellowish at distal extremity; legs uniformly grey-brown with golden colored setae. *Head:* eyes holoptic, well developed with two kinds of facets, without stemmatic bulla on the posterior margin of the eye *(fig. 1)*. Antenna blackish with 11 segments; scape with verticille of setae touching the distal rim of the next segment; setae more or less verticiliated on the pedicelle, terminating at the basal third of the 3rd segment, at other sites setae about the length of flagellar segments. Mouthparts very short; maxillary palp short, the last segment slightly longer than the 3rd; sensory vesicle reduced. Clypeus with long erect setae. *Thorax* strongly arched dorsally; pronotum bare at median part; scutum covered with rather dense fine recumbent setae and sparse semi-erect or erect setae; postnotum regularly convex, bare and without a median longitudinal ridge; katepisternum in profile about as high as long delimited by a shallow and hardly visible mesepisternal sulcus; pleural membrane bare; group of mesepimeral setae extending towards the ventral side under the metathoracic spiracle. *Wings* hyaline with strong anterior veins; costal vein covered with hair-like macrotrichia, without spiniform macrotrichia; Rs vein clearly forked; basal section of R haired; petiole of vein M like in *Prosimulium;* vein Cu_2 curved; basal cell easily visible. *Legs* with uniform color; fore basitarsus narrow, about 2/3 of the length of the tibia; hind leg without pedisulcus and calcipala; length of hind basitarsus 3/5 of tibia *(fig. 2, 3, 4). Terminalia:* gonocoxite, in ventral view, higher than wide and narrower at its base; gonostylus shorter than gonocoxite, its outer side convex, its inner side almost straight with two apical spinules (visible in magnification $\times 40$) *(fig. 5);* ventral plate small and rectangular with parallel lateral margins and slightly developed forearms *(fig. 7);* in profile ventral plate is equally wide throught its length and is covered with short and stout hairs *(fig. 11, 12);* ventral plate at anterior part protruding medially between arms as a dome which does not extend beyond the arms and is fused with the median sclerite; this last sclerite is long, flattened and arched, the distal part moderatly cleft with two ends turned outwards *(fig. 8, 9, 10);* paramere stick-like not attached to forearm of ventral plate, strongly fused with parameral apodeme of gonocoxite and free at its distal part *(fig. 6);* sclerotized cerci each bearing about 20 setae. Tergite 9 strongly sclerotized, trapezoid, with posterior part slightly rounded.

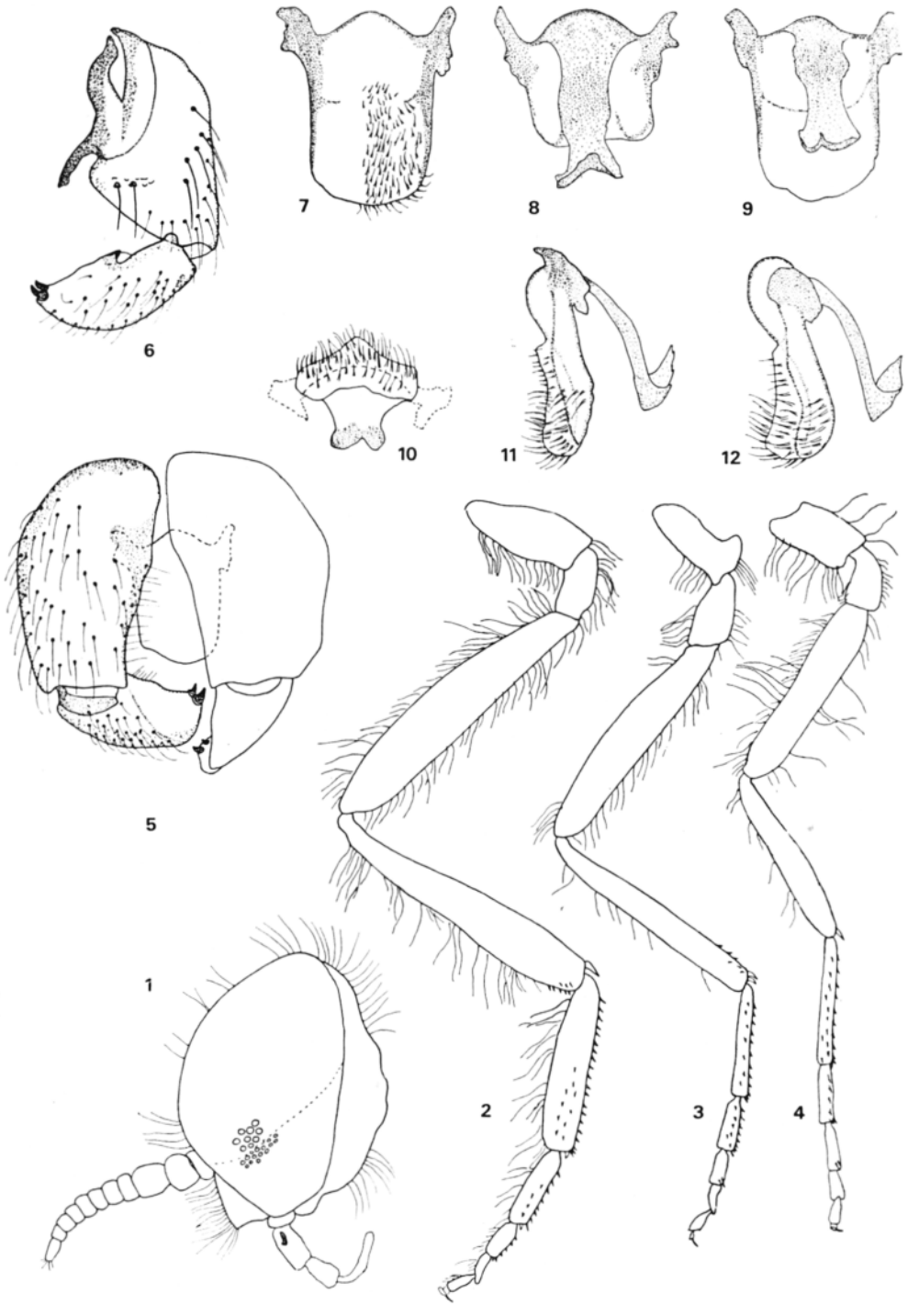

FIG. 1-12. — *Levilinia freidbergi* n. sp., male. 1. lateral view of head; 2-4. hind, mid and fore legs; 5. ventral view of genitalia; 6. gonocoxite and gonostylus showing paramere fused to coxite; 7-12. different views of ventral plate; 7. in ventral view; 8, 9. in dorsal view; 10. in apical view; 11, 12. in profile.

FEMALE

Length 3.5 to 4 mm; wing length 3.5 mm; colour of body greyish-black with yellow-golden setae; scutum almost black as in male; legs grey covered with yellow-golden setae; scutum of pinned specimens with recumbent setae. *Head (fig. 13, 14):* eyes dichoptic with all facets similar in size; front widens towards vertex and covered with rather long setae which are arranged regularly. Antenna with 11 segments, 1st flagellomere about equal in length and width to pedicel; flagellomeres 2-8 each are half the lenght of the 1st; clypeus blackish with long erect setae distributed allover. Mouthparts normally developed: mandibles with 24 + 8 teeth; laciniae with 14 + 9 teeth *(fig. 17, 18);* maxillary palp small, last two segments almost in the same length as the third, sensory vesicle occupies more than 1/3 of 3rd segment *(fig. 16). Thorax:* generic characters were given in the male description *(fig. 15, 24, 25). Legs:* fore basitarsus narrow, half length of tibia; hind basitarsus slightly longer than half tibia *(fig. 20, 21, 22);* claws relatively long with visible basal tooth that measures 1/4 length of principal tooth *(fig. 23). Genitalia (fig. 26, 27)*: abdomen terminates with small dart-like tip produced dorsally by tergite 9; 9th tergite is wide at base and produces latero-ventral extensions connected with ends of lateral arms of genital fork; from the anterior quarter it is narrower and tapering posteriorly; on its inner ventral face it looks as there is a groove, which indicates a possibility of egg laying in or on appropriate substrate; dorsal cuticle of 9th tergite covered dorsally with many short setae. Sternite 8 relatively narrow; gonapophyses short with sclerotization lines and 5-6 short setae, not reaching anal lobes (paraproctes); inner anterior angle of each gonapophyses prominent; central part of genital fork narrow, widened anteriorly; arms of genital fork very broad measuring more than half length of median part; anal lobe and cercus separated by membrane moderately sclerotized; cerci almost rectangular, with posterior angle more slender reaching the distal 1/6 of tergite 9. Spermatheca mushroom-like, with a large unsclerotized area at junction with spermatecal duct.

PUPA

Body length 5-5.5 mm, respiratory filament 4-4.5 mm *(fig. 3). Cocoon* absent, except for a few uncolored strands at tip of abdomen, incorporating small pieces of debris. Eight *respiratory filaments* with two principal trunks, the upper one smaller in its diameter than the lower; variations exist in situation, length and opening-angle of filaments (30 up to a maximum of 90°); upper trunk always with two filaments, lower with six filaments varying in their situation from specimen to specimen, or even from one side to the other of the same specimen (generally three or four bifurcations) *(fig. 28, 29, 30);* integument of frons and thorax with many small irregular granules *(fig. 35, 36);* trichomes simple and short. *Abdomen* with fine granular integument; tergal and sternal plates clearly separated by longitudinally striate semi-membranous area; a pair of pleural plates isolated from tergal

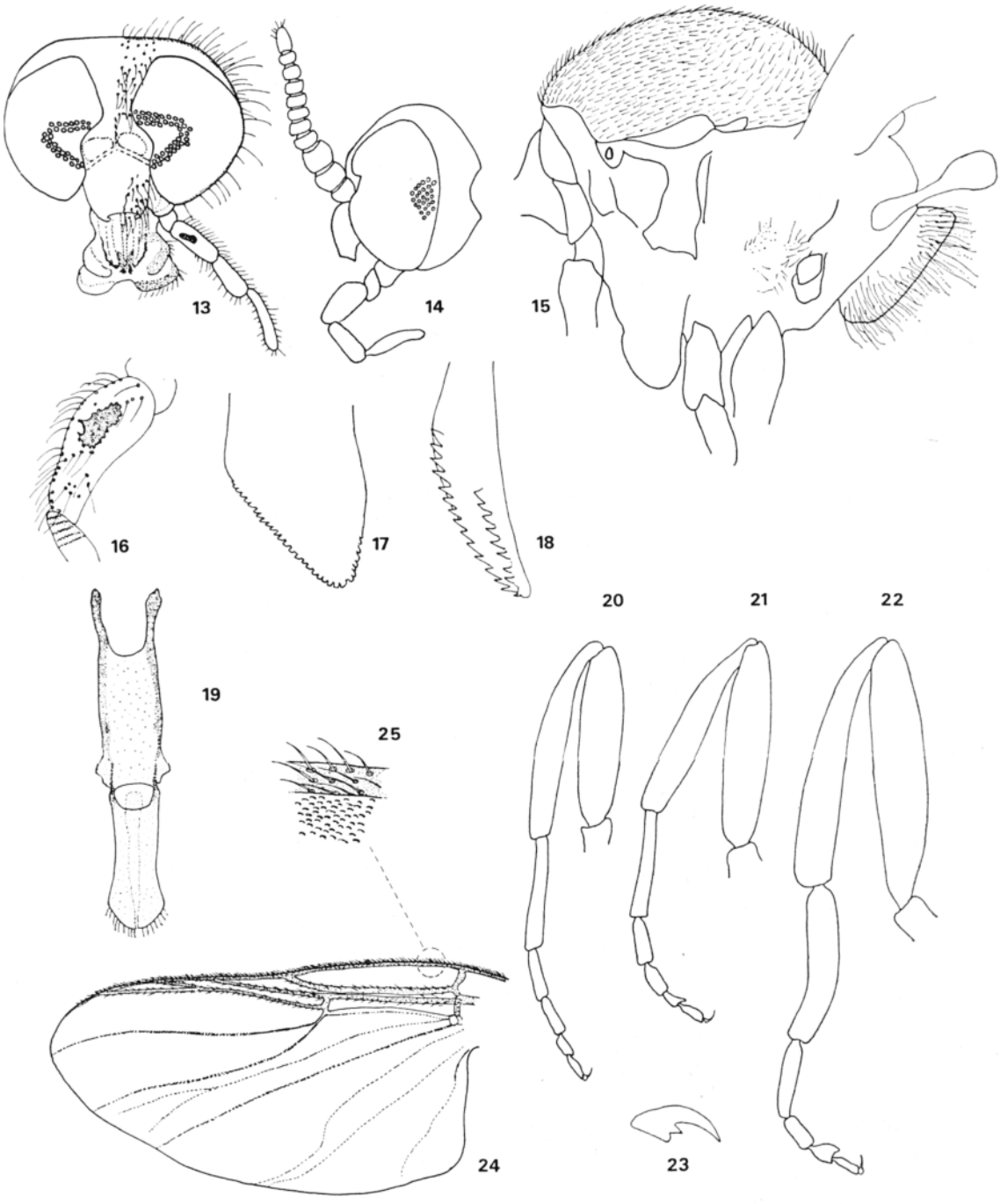

FIG. 13-25. — *Levitinia freidbergi* n. sp., female. 13, 14. anterior and lateral view of head; 15. lateral view of thorax; 16. 3rd segment of maxillary palp with sensorial pit; 17, 18. mandible and lacinia; 19. cibarium and hypopharynx; 20-22. fore, mid and hind legs; 23. tarsal claw; 25. wing and details of costal vein.

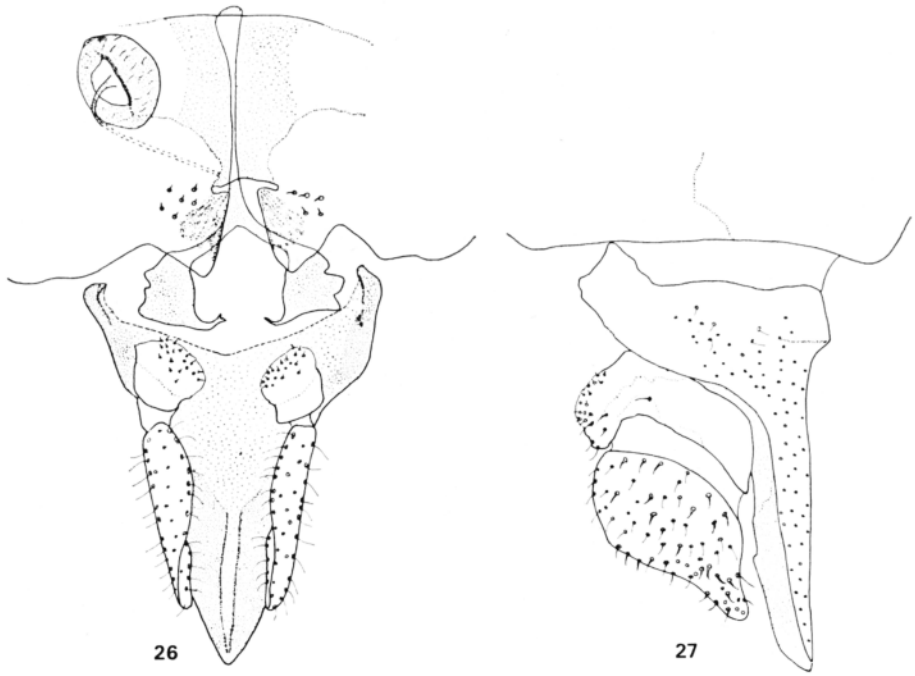

FIG. 26, 27. — *Levitinia freidbergi* n. sp., female.
Ventral and lateral views of genitalia.

and sternal plates in segment 5; sternites 6 and 7 divided in the mid-line by semi-membranous striate area. *Onchotaxy (fig. 32, 33, 34):* sternites 4-7 with two pairs of hooks, well developed in segments 5, 6 and 7; tergites 2-4 with eight hooks more or less developed; tergites 6-8 with discrete line of small spines; segment 9 with two large terminal spines directed dorsally; lateral sides of segment 9 with fine simple or multibranched setae.

LAST INSTAR LARVA

Length 8-9 mm; color generally grey-yellow, head capsule brown. Lateral margins of *head* capsule strongly convex like that of the primitive genera *Twinnia* and *Gymnopais*. Labral fans absent. Cephalic apotome very narrow at posterior part, widest in median part and tapering then after; head spots consisting of a large and rectangular posteromedian group which extends largely over each side of median line; two anterolaterally subgroups of several small spots *(fig. 39)*. Post-genal cleft without definite shape and very reduced; hypostomal bridge large *(fig. 38)*. Anterior margin of hypostomium with central group consisting of one large, prominent tooth and four reduced lateral teeth; on either side, another

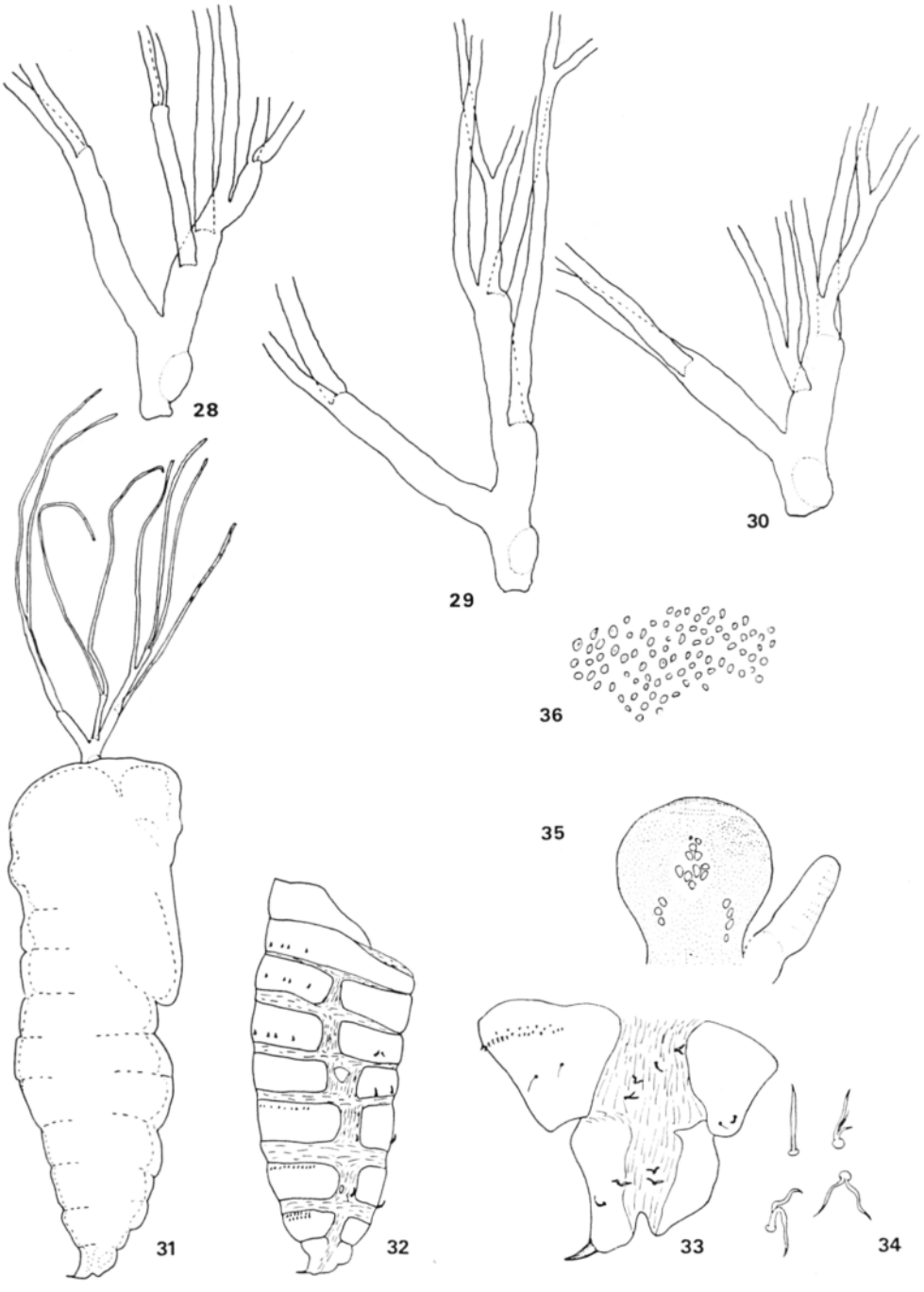

FIG. 28-36. — *Levitinia freidbergi* n. sp., pupa. 28-30. respiratory filaments from three different specimens; 31. general morphology; 32-34. chetotaxy of abdomen; 35, 36. cephalic plate and details of cuticular ornamentation.

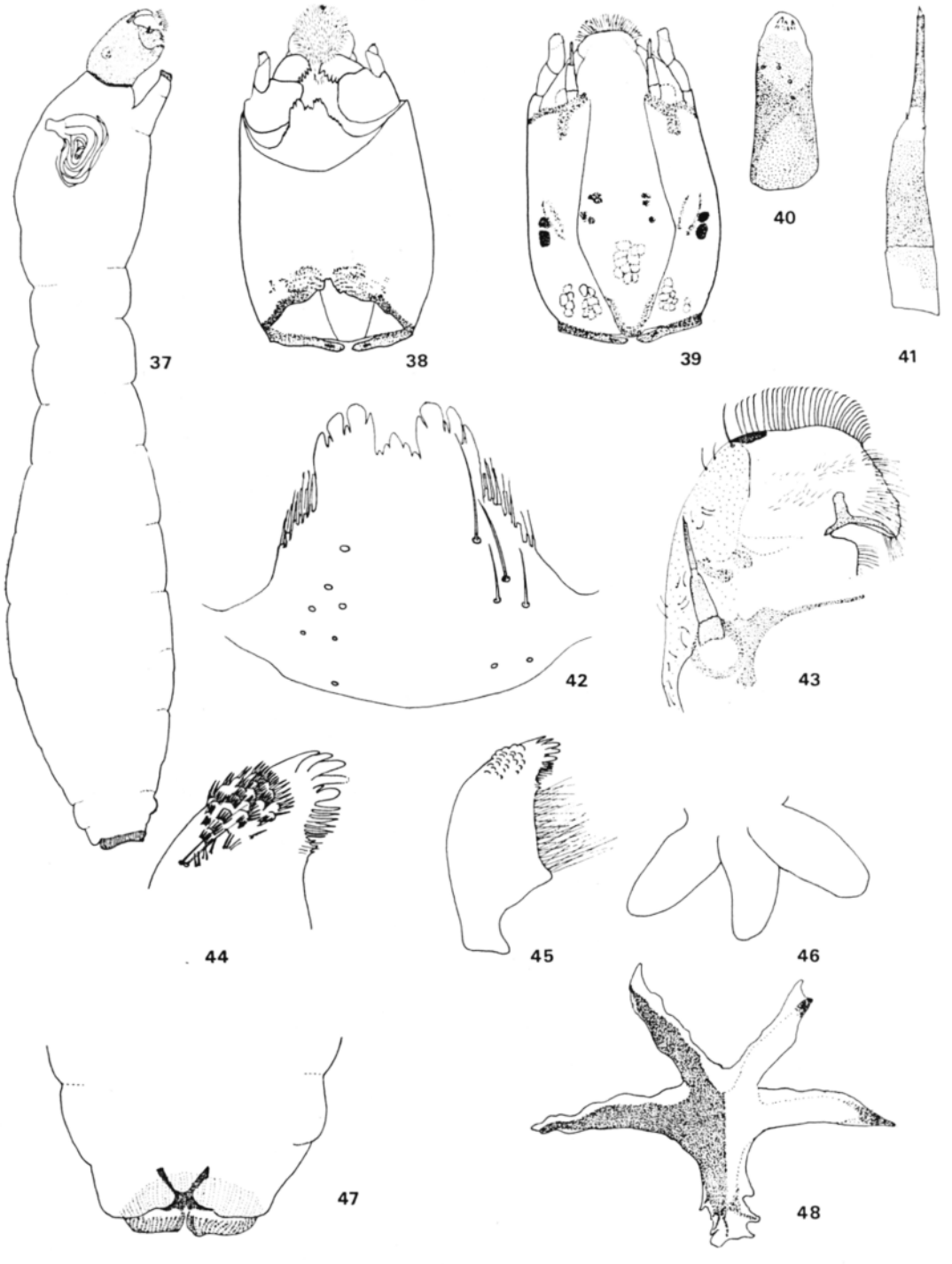

FIG. 37-48. — *Levitinia freidbergi* n. sp., larva. 37. general morphology; 38, 39. ventral and dorsal view of head capsule; 40. maxillary palp; 41. antenna; 42. hypostoma; 43. lateral view of labral region; 44, 45. mandible; 46. anal gills; 47. dorsal view of posterior tip of abdomen; 48. anal sclerite.

group strongly protruding with three spade-like serrated teeth, decreasing in height laterally; lateral margins of hypostomium producing 6-8 very fine and long bristle-like cuticular outgrowths; a sublateral row of 6-7 short setae ventrally on each side of hypostomium *(fig. 42)*. Labrum conical, elongated measuring slightly less than 1/3 of total head capsule length with an anterior median brush (antero-median palatal brush *in* Craig, 1974); labral brush large, with numerous setae, curving and tapering towards ventral side, more similar to brush of *Gymnopais* than to paint-brush of *Twinnia (fig. 49, 50)*; before setae 2 C (according to Craig, 1974) a small strongly sclerotized tongue-like area situated on the postero-median part of the brush; on the sides of labrum, sclerites of torma present; epipharynx covered with long setae arranged regularly; intertorma well developed *(fig. 43)*. Short and swollen antenna not reaching labral brush, with pattern like *Twinnia, Gymnopais* and *Prosimulium*, but wholly pigmented; 1st segment slightly longer than half length of 2nd; 3rd segment slightly shorter than the 2nd *(fig. 41)*. Mandibles very close to those of *Gymnopais* particularly by presence of 7-8 irregular rows of distinct spine-like outgrowths of cuticle at the antero-ventral region *(fig. 44, 45, 49)*; each cuticular extension carries 2-6 straight and fine teeth; apex of mandible with five flattened, distally rounded teeth, the 5th tooth shorter than the 4th; then 8-11 moderately long subapical teeth, decreasing in diameter; mandibular serrations with 2-3 irregular teeth. Maxillary palp swollen, pigmented part twice as long as widest part *(fig. 40)*; hair tuft at the base fewer than in *Prosimulium*. Integument of head capsule with numerous secondary short setae.

Body slender, slightly arched, little enlarged in posterior abdominal segments *(fig. 37)*; a pair of like-bulge tubercles scarcely visible latero-ventrally on segment 8; characteristic anal sclerite with five branches homologous to X-shaped sclerite of *Prosimulium* and Y-shaped sclerite of *Gymnopais* and *Twinnia (fig. 48)*; fifth unpaired branch situated perpendiculary to sclerite and not visible in dorsal view; anal gills composed of three simple digitiform lobes *(fig. 46)*; posterior ring of hooks with about 80 rows each of 13-15 hooks; thoracic and abdominal cuticle bare.

Material examined: Israel, Golan Heights, Merom Golan.

Holotype female obtained from a pupa collected 18.3.1982, Y. Braverman; allotype male, 17.3.1981, A. Freidberg; 4 males, 6 females, 12 pupae and *ca* 100 larvae paratypes, same data as holotype and allotype, Y. Braverman and A. Freidberg. Holotype, allotype and most of paratypes deposited in the Department of Zoology at Tel-Aviv University. Some paratypes deposited in the Laboratory of Applied Parasitology and Zoology, U. E. R. of Medicine and Pharmacy, Rennes, France and ulteriorly in Laboratoire d'Entomologie, Muséum National d'Histoire Naturelle, Paris.

The new species is named after A. Freidberg who collected the first specimens.

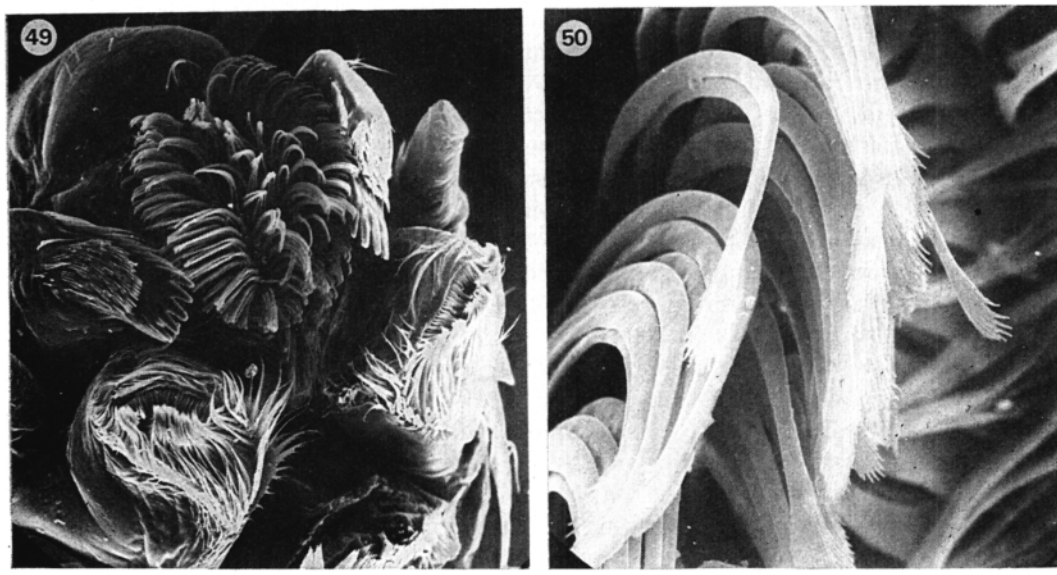

FIG. 49, 50. — *Levitinia freidbergi* n. sp., S. E. M. micrograph of frontal region of head capsule; 49. labral brush, comb-like scales of mandible; 50. apex of median setae of labral brush.

DISCUSSION

The hitherto monotypic genus *Levitinia* was proposed for *L. tacobi* Chubareva and Petrova, 1981, a species that was based only on the description of larvae collected in Tadjikistan. We are placed *L. freidbergi* n. sp. in *Levitinia* because of the great similarly between the larvae of both species.

Chubareva and Petrova (1981), Rubtsov and Yankovsky (1984) ranked *levitinia* in *Gymnopaidinae* with primitive genera *Gymnopais* Stone and *Twinnia* Stone and Jamnback. These two holarctic genera have affinities with *Levitinia* on account of the larval morphology and the lack of labral cephalic fans. We prefer to follow the classification of Crosskey (1981, 1985) and to place *Levitinia* in the *Prosimuliini* (Subfamily *Simuliinae*) to recognize the relationship between adults of *Levitinia* and *Prosimulium* Roubaud.

Several characters justify the placement of *Levitinia* in *Prosimuliini:* shallow and virtually absent katepisternal sulcus; height of katepisternum equal to length; wing veins without spiniform macrotrichia; vein Rs forked; basal cell present; pleural membrane bare; pedisulcus absent; first tarsomere of foreleg slender; last segment of maxillary palp very short (Crosskey, 1969).

The following is a discussion comparing *Levitinia* with closely related *Prosimuliini.* Tables I, II and III summarize the principal generic characters of *Levitinia* and the possible variations within the 3 genera *Gymnopais, Twinnia* and *Prosimulium* in the adult, pupa and last instar larva. This comparison is based on the works of Novak (1957) on *Twinnia,* Davies (1965) on *Gymnopais,* Craig (1974) and

Wood (1978) on both genera, Rubtsov (1959-1964; 1974), Stone (1963; 1964), Crosskey (1969), Rivosecchi (1978) and Peterson (1970; 1981) on *Prosimulium*. As for *Twinnia*, the comparison was done with material at our possession (Beaucournu-Saguez and Rivosecchi, 1982).

ADULT *(table I)*

The *table I* shows noticeable differences between *Levitinia* and *Gymnopais*. This last genus is very typical owing to some general characters of the body, eyes, antennae, wings, hairy (coarse, rare and erect) zone of the thorax and in several genitalia structures of the male and female. Despite the fact that *Gymnopais* has characters of *Prosimuliini*, *Gymnopais* looks (with its flat thorax) deviating taxonomically from *Simuliidae*. According to Davies (1965) it shows affinity to *Chironomidae*.

In contrast, *Levitinia* with its normally high and arched scutum could be considered as typical simuliid genus similar to *Twinnia* and *Prosimulium*.

TABLE I. — Comparison between the adult stage of four closely related genera belonging to the *Prosimuliini*.

Levitinia freidbergi	*Gymnopais*	*Twinnia*	*Prosimulium*
Eyes normally developed	Eyes might be small and dichoptic in the male	(1) L	L
Without stemmatic bulla	Stemmatic bulla present	G	L
Antenna with 11 segments	9 segments	G	L (Exceptions exist)
Female mandibles and laciniae with teeth	Without teeth	L (Exceptions exist)	L
Thorax strongly arched	Thorax weakly arched	L	L
Scutum with rather dense fine recumbent setae and sparse erect setae	Scutum with coarse, sparce and erect setae	L	L
Postnotum rather large, without median longitudinal ridge	Postnotum rather small sometimes with median longitudinal ridge	L	L

(1) The letters L, G and T indicate similarity in the related criterion with the corresponding genera: *Levitinia*, *Gymnopais* and *Twinnia*.

TABLE I *(Continued)*.

Levitinia freidbergi	*Gymnopais*	*Twinnia*	*Prosimulium*
Pleural membrane bare	Usually with a small group of setae	L	L (Exceptions exist)
Mesepimeral setae extending below the metathoracic spiracle	Mesepimeral setae confined above the metathoracic spiracle	L	L
Large transparent wings	Narrow fumose wings	L	L
Tarsal claw of female with distinct basal tooth	Claw simple	G	Claw variable
Female with short gonapophyses	L	L	Gonapophyses variable
Anal lobe and cercus of female separated by membrane	Anal lobe and cercus fused into a single sclerite	L	L
Sclerotized spermatheca with a large transparent area in its base	Completely sclerotized spermatheca with sclerotization extending a short distance down the duct	L (Spermatheca sometimes not sclerotized)	L (Exceptions exist)
Tergite 9 of female long and dart-like	Tergite short and blunt	G	G
Gonostylus of male with 2 clearly visible spines ($\times$ 40)	More than 2 spines, hardly visible	1 visible spine (rarely 2)	1 or more visible spines
Ventral plate of male higher than its width with anterior arms not prominent; lateral margins parallel	Ventral plate wider than its height with anterior arms prominent	Width / height variable; anterior arms prominent; lateral margins emarginate	Ventral plate generally wider than its height with anterior arms variable
Ventral plate with dome-like extension to which the anterior margin of median sclerite is fused	Ventral plate without dome-like extension	L ?	G (Exceptions exist)
Paramere reduced to a stick strongly fused to parameral apodeme of gonocoxite	Paramere more developed, connected to gonocoxite by a slender stem	G	Paramere discretily connected to gonocoxite (exception exist)

Twinnia and *Prosimulium* are very close: several authors (one of them Shewell, 1958) propose to consider *Twinnia* as subgenus of *Prosimulium*. However, the separation of *Levitinia* from *Twinnia* is possible, based on three characters: number of segments of the antenna (11 instead of 9 in *Twinnia*), absence of stemmatic bulla on posterior margin of eye and claw of female with basal tooth (undeveloped in *Twinnia*). Several details of the genitalia support this distinction.

While the adults of *Levitinia* show morphological differences with *Twinnia* and *Gymnopais*, no generic character permits to distinct it from *Prosimulium*. Males of *Levitinia* isolated from larval stages cannot easily identified. But we must remark male genitalia, while close to *Prosimulium*, present some own details of structure: ventral plate with anterior part protruding as a dome, median sclerite anteriorly fused to ventral plate, paramere stick-like strongly fused to gonocoxite. Because of these connections, terminalia seem very single and are unusual in genus *Prosimulium*.

The determination of females of *Levitinia* is not possible if we only consider the two features: small gonapophyses and tarsal claw with a distinct basal tooth. These characters are found equally in some subgenera within *Prosimulium*. The specifics of female of *L. freidbergi* are reflected by the developed dark-like last abdominal tergite. The morphology of this tergite could be an available criterion to separate the two genera. But as the female of *L. tacobi* is not known, it is difficult to decide if the specific shape of 9th tergite is own to the genus or only to the new species.

Pupa *(table II)*

As for the adult, the pupal stage of *Levitinia* does not show any character that enables to differentiate it from *Prosimulium*. However, it can be distincted from *Twinnia* and *Gymnopais* by onchotaxy of abdomen, presence of semi-membranous area between tergite and sternite of segment 3, and number of respiratory filaments.

Larva *(table III)*

Contrary to the pupal and adult stages, the larva of *Levitinia* is morphologically close to those of primitive species of *Prosimuliini*.

In that tribe there are essentially four genera which belong to the same monophyletic group: *Gymnopais*, *Twinnia*, *Crozetia* and *Prosimulium* (Crosskey, 1969; Craig, 1974).

The absence of cephalic fans which is considered to be plesiomorphic or apomorphic character (Grenier and Rageau, 1960; Dumbleton, 1962; Davies, 1965; Craig, 1974; Wood, 1978) is the first criterion which enables to associate *Gymnopais* to *Twinnia*. The larvae of the two genera are characterized by specific morphology of the head capsule which is narrow at anterior end bearing a labral brush. In the other genera of *Simuliidae*, the development of the complex structure of labral fans which originated from the labrum caused the widening of head and the loss of functional brush.

TABLE II. — Comparison between the pupal stage of the four closely related genera belonging to the *Prosimuliini*.

Levitinia freidbergi	*Gymnopais*	*Twinnia*	*Prosimulium*
8 respiratory filaments *(L. freidbergi)* or 10 *(L. tacobi)*	2-4 respiratory filaments	14 or 16 respiratory filaments	Variable number of respiratory filaments (from 6 to over 100)
Cocon reduced to a few transparent threads	L	Cocon usually present but transparent	Cocon usually present, pigmented, without defined form
Sternite and tergite of third abdominal segment separated by striated membraneous area	Sternite and tergite fused together forming a ring without vestige of pleurite	G	L
Tergite 5 without a row of spines; sternite 3 without hooks	Tergites 5-8 without a row of spines; sternite 3 with or without hooks	Tergites 5-8 without a row of spines; sternites 3 and 4 without hooks	Fully developed onchotaxy
Abdomen with 2 long strong terminal hooks	Terminal hooks reduced	L	L

The larvae of *Crozetia* which are an element of the subantarctic fauna preserved the narrow head capsule of *Gymnopais* and *Twinnia* despite the presence of labral brush and labral fans in all the larval stages. The cephalic fans in this genus are reduced and have only the function of raking substrate and not water filtration (Davies, 1965; 1974).

In *Prosimulium* the premandibles are well developed and functional beginning from the second larval stage; the labral zone is widened considerably. However, the first larval stage shows a narrow labrum, a few cephalic fan rays and a labral brush similar to corresponding stages of the three other genera (Davies, 1960; 1965; Craig, 1974).

The monophyly of these four genera was confirmed in comparative studies on the evolution of cephalic fan rays, parts of torma and labral muscles of early larval stages (Craig, 1974).

The first larval stage of *Levitinia* was not studied until now. Nevertheless it is certain that the morphology of the head capsule of the subsequent stages (absence of cephalic fans, presence of well developed labral brush) allows to consider *Levitinia* as closely related to *Twinnia* and *Gymnopais*. This is also confirmed by cytological study on *Levitinia tacobi* in which Chubareva and Petrova (1981), found the same particular differences as in two primitive genera *Twinnia* and

TABLE III. — Comparison between the last instar larva of the four genera related to the *Prosimuliini*.

Levitinia	*Gymnopais*	*Twinnia*	*Prosimulium*
Cephalic fan absent	L	L	Cephalic fan present
Labral brush well developed	L	L	Labral brush not developed (except in the first larval stage)
Cephalic apotome widest in median part	L	L	Cephalic apotome widest in third posterior of its height
Postgenal cleft very reduced	L	L	Postgenal cleft variable, generally wide and not deep
7-8 irregular row of spine-like outgrowths of cuticle on the antero-ventral region of mandible	L	Absence of out growth of cuticle	T (mandible different)
6-8 bristle-like cuticular outgrowths on lateral margins of hypostoma	Short serrations	G	G
Antenna wholly dark pigmented	Third segment only dark pigmented	G	G
Labrum narrow and long; antenna not reaching labral brush	L	Labrum narrow and proportionally shorter; antenna reaching beyond labral brush	Labrum wide
Anal sclerite with 5 branches	Sclerite Y-shaped	G	Sclerite X-shaped

Gymnopais (chromosomes homologues tightly paired, hardly visible centromeres, presence of nucleolar organized in chromosome I).

Considering the data of *table III*, it seems that the larvae of *Levitinia* are mainly close to those of *Gymnopais*. This is based on the following features: spine-like cuticular outgrowths on antero-ventral surface of mandible, rather long labrum as compared with antenna, and large development of labral brush.

On the other hand the larvae of *Levitinia* differ from those of *Gymnopais* and *Twinnia* by several characters: antennae entirely pigmented, cuticular bristle-

like expansions on lateral margins of hypostoma and particular morphology of posterior sclerite (with 5 branches).

Table IV shows the principal characters for distinguishing the only two species that comprise the genus *Levitinia*.

TABLE IV. — Criteria for differentiation *Levitinia freidbergi* Beaucournu-Saguez and Braverman from *Levitinia tacobi* Chubareva and Petrova.

L. freidbergi	*L. tacobi*
8 respiratory filaments	10 respiratory filaments
Respiratory filaments arise from 2 main trunks	Respiratory filaments arise from 3 trunks
Central group of teeth of anterior margin of hypostoma very blunt	Central group of teeth prominent
Mandible with fifth apical tooth shorter than the fourth	Fifth tooth of the same length as the fourth

Ecological and biogeographical notes

General description of the zoogeography and geography of the Golan Heights was already given by one of us (Braverman *et al.*, 1981). The sampling site area at Merom Golan (33°36′ N 35°25′ E) was in a plateau at elevation of *ca.* 950 m. The *Simuliidae* samples were taken from a tiny winter stream which dries out during mid-May. The source of the water is rainfall which in this area of northern Golan Heights amounts to annual average of 822 mm (Israel Meteorological Services). In 1980-1981 the annual rainfall was 1,142.9 mm and in 1981-1982 it was 748.5 mm. Stream width was 0.85-2.7 m; depth 0.20-0.45 m; speed of flow 2.5 sec per 1 m; stream bed consists of soil and basalt stones, water was fully exposed to the sun. The other *Levitinia* species *i. e. L. tacobi* was found only in Gissorky mountains not far from Takob village in the Tadjikistan Republic. It was collected in June 2, from a small mountain stream a an altitude of 2,000 m.

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