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DESCRIPTION OF THE IMMATURE STAGES, ADULT MORPHOLOGY AND BIOLOGY OF *PANTOCHLORA VIVIDA* STÅL (HETEROPTERA: PENTATOMIDAE: EDESSINAE)

LUIS CERVANTES PEREDO

Instituto de Ecologia, AC. Apartado Postal 63 Xalapa C.P.91000, Veracruz, Mexico

Abstract.—The life cycle of *Pantochlora vivida* Stål is reported for first time. Descriptions and illustrations of adult and immature stages are made. Characteristics of the adult genitalia and some ontogenetic characters support placement of *Pantochlora* in the pentatomid subfamily Edessinae. *P. vivida* feeds almost exclusively on new shoots and leaves of several species of two closely related genera of Leguminosae, *Lonchocarpus* and *Piscidia.* Its geographical distribution is restricted to southern Mexico and Central America.

The subfamily Edessinae, in which *Pantochlora vivida* Stål is included, is represented only by phytophagous species of Neotropical distribution (Rolston and McDonald, 1979). The genus *Pantochlora* was described by Stål (1870), who included one species, *P. vivida* from Campeche, Mexico. He related this genus with *Piezosternum* because of similarities on the metasternal spine and placed both genera in the division Piezosternaria. Distant (1880–1893) placed *P. vivida* in the subfamily Tessaratominae, but Horváth (1900) created the tribe Pantochlorini in which he placed *P. vivida.* Blöte (1945) also considered *P. vivida* within the same categories. Leston (1955) suggested the possible relationship of Pantochlorini with Edessini based on the male and female genitalia. Kumar (1969), on the basis of the same characters, transferred Pantochlorini to Pentatomidae. Kumar & Ghauri (1970) raised the subfamily Tessaratominae to family level and placed Pantochlorini in the family Tessaratomidae. Pirán (1971) reviewed the Neotropical Tessaratominae, including *P. vivida.* Finally Rolston & McDonald (1979) elevated Edessini to subfamily level including *Pantochlora* in it. In the present study *Pantochlora vivida* is redescribed, and its life history stages are described and illustrated for first time. Host plants and biology of the species are also discussed.

MATERIALS AND METHODS

The present study was based mainly on individuals deposited in the Entomological Collection of the Instituto de Biologia, U.N.A.M., Mexico, and in the entomological collections of the two field stations belonging to the Instituto de Biologia ("Los Tuxtlas," Veracruz and Chamela, Jalisco). Material deposited in The Natural History Museum in London, England, was also checked. A total of 155 females, 111 males, 138 nymphs, and 76 eggs were studied.

Most of the biological information was obtained from a series of field studies conducted between 1985 and 1989 in "Los Tuxtlas", Veracruz, Mexico. Ten day

monthly visits were made during 1985 and 1986 and more irregular visits were made during 1987–1989. Some other biological data and host plants were recorded from different field trips around Mexico, and from specimens deposited in the collections.

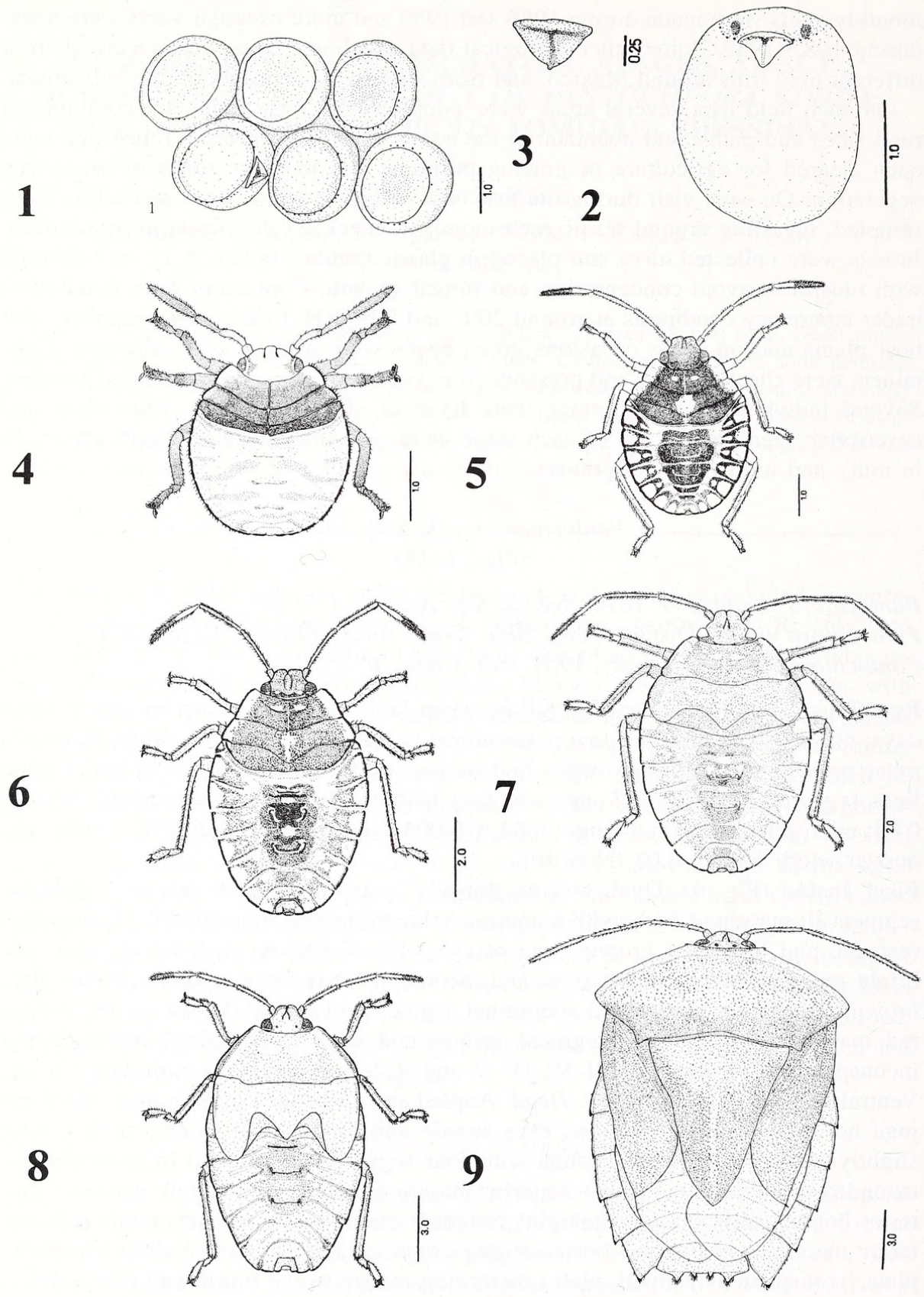
On each field trip, several areas were sampled. The host plants are common on road sides and paths, and abundant at the edges of sites in primary forest that have been cleared for agriculture or grazing purposes and in other zones of secondary vegetation. On each visit during the first two years, the same roads and edges were sampled, investing around 60 hr each month to check all the plants in these areas. Insects were collected alive and placed in plastic containers (11 × 11 cm) covered with muslin to avoid condensation and fungal growth. Containers were maintained under laboratory conditions at around 20°C and 70% RH. Insects were supplied with host plants and on some occasions green beans were offered as a substitute. Containers were checked daily and presence of eggs and changes in individuals recorded. Several individuals of each stage were fixed in 70% alcohol for illustration and description. Ten individuals of each stage were measured (measurements are given in mm), and used for descriptions.

Pantochlora vivida Stål, 1870
(Figs. 1–18)

Pantochlora vivida Stål, 1870. *Svensk. Vet. Ak. Hand.* 9: 65
Pantochlora vivida: Distant, 1881. *Biol. Centr. Amer. Rhynch.* 1: 102, 351
Pantochlora vivida: Kirkaldy, 1909. *Cat. Cimic.* b: 358

Egg (Figs. 1–3). Barrel shaped, yellow when laid, becoming green in two or three days; chorion smooth, with few punctations; pseudoperculum with 36 to 40 micropylar projections. Females always laid masses of 14 eggs arranged in two regular lines (egg masses = 6). *Allometries.* Egg length 1.80 ± 0.06; egg width 1.63 ± 0.04; micropilar projection length 0.02 ± 0.004; egg burster length 0.70 ± 0.06; egg burster width 0.43 ± 0.02 (N = 10).

First Instar (Fig. 4). Oval, convex dorsally, maximum width around abdominal segment II; margin of body with numerous setae projecting upwards. Head, antennae, rostrum, and legs light brown; base of eye with or without dark brown spot; eye bright red. Pronotum, mesonotum, and metanotum dark brown, lateral border light brown; margins of thorax and abdominal segments black. Abdomen yellow-brown, red marks delimiting each segment and around each lateral plate; middle plates inconspicuous on segments III–IV, IV–V and V–VI; scent glands with dark margin. Ventral surface of body yellow. *Head.* Angled and embedded in pronotum; tylus and juga not visible in dorsal view; eyes sessile and longer than frontal angles; tylus slightly shorter than juga; antenna with four segments, the fourth longest; rostrum extended to metacoxa. *Thorax.* Anterior margin of pronotum strongly concave; posterior border convex; lateral margins rounded; mesonotum and metanotum with anterior margin concave and posterior one convex; lateral plates slightly triangular; plate I conspicuously small, plates increasing in size to the fourth and then reduced in size; scent glands on segments III–IV, IV–V and V–VI, the first one very small and long, remaining two evident and ellipsoidal. *Allometries* (N = 10). Body length 2.58 ± 0.08; body width 2.46 ± 0.07; head length 0.44 ± 0.01; head width 0.99 ± 0.02; interocular distance 0.66 ± 0.02; antennal segments: I 0.22 ± 0.02, II 0.39 ±



Figs. 1–9. *Pantochlora vivida* Stål. 1, Egg mass. 2, Single egg showing egg buster and eyes. 3, Egg buster. 4, First instar nymph. 5, Second instar nymph. 6, Third instar nymph. 7, Fourth instar nymph. 8, Fifth instar nymph. 9, Adult.

0.01, III 0.46 ± 0.06, IV 0.78 ± 0.06; rostral segments: I 0.25 ± 0.01, II 0.34 ± 0.03, III 0.25 ± 0.03, IV 0.29 ± 0.06; pronotum length 0.39 ± 0.06; humeral width 1.70 ± 0.05; frontal width 1.11 ± 0.11; femur 0.85 ± 0.05; tibia 0.84 ± 0.04; tarsi: I 0.24 ± 0.01, II 0.40 ± 0.02.

Second Instar (Fig. 5). Oval, flattened dorsoventrally; margins of pronotum, mesonotum, metanotum, and lateral plates serrated and densely setose; dorsal punctations present. Head with numerous dark brown punctations; anterior half pale yellow, posterior half dark brown; antennal segments I and II yellow, III with distal half light brown and IV with distal half dark brown; rostrum yellow-brown with apex dark brown. Pronotum, mesonotum, and metanotum with numerous dark brown punctations, except transparent lateral borders. Pronotum with white spot on each side of midline; metanotum with yellow-brown spot in middle and a pair of smaller yellow-brown spots adjacent. Thoracic pleura with yellow and dark brown spots; legs yellow, femur slightly darker than other segments. Lateral plates punctate, delimited by dark brown area; middle plates dark brown and punctate; dorsal sutures red; ventral surface yellow. *Head.* Apex slightly square; juga longer than tylus, joining in front of it; rostrum extended beyond metacoxa; eye kidney shaped. *Thorax.* Mesonotum with lateral margins elevated; metanotum slightly reduced at middle and at lateral margins; glands opening between propleura and mesopleura, and between mesopleura and metapleura. *Abdomen.* First lateral plate triangular, others with an area of punctations resembling an "A"; middle plates on segments III–IV, IV–V, V–VI, VII, and VIII; first three with senescent openings, middle plates I and II rectangular; III slightly compressed at middle, plates IV and V small and irregular; spiracule on sternum II–VIII and a pair of trichobothria below spiracles II to VII. *Allometries* (N = 10). Body length 3.84 ± 0.1; body width 3.39 ± 0.08; head length 0.67 ± 0.02; head width 1.33 ± 0.02; interocular distance 0.85 ± 0.03; antennal segments: I 0.26 ± 0.04, II 1.0 ± 0.03, III 1.97 ± 0.05, IV 1.43 ± 0.05; rostral segments: I 0.39 ± 0.03, II 0.51 ± 0.04, III 0.28 ± 0.04, IV 0.36 ± 0.04; pronotum length 0.58 ± 0.07; humeral width 2.32 ± 0.07; frontal width 1.44 ± 0.13; femur 1.57 ± 0.05; tibia 1.69 ± 0.09; tarsi: I 0.32 ± 0.01, II 0.50 ± 0.03.

Third Instar (Fig. 6). Body oval, flattened dorsoventrally; maximum width through abdominal segment II; thoraxic margins serrated, fine setae only around the last abdominal segments. Very similar to second instar in most characters. Dark brown areas yellow on almost entire body except lateral margins, middle plates, and base of head; white spots of pronotum slightly evident; white spots on apex of lateral plates and on anterior region of lateral plates I–III; rostrum extended to mesocoxa; scutellum extended to metanotum. *Allometries* (N = 10). Body length 6.35 ± 0.17; body width 4.63 ± 0.1; head length 0.96 ± 0.03; head width 1.79 ± 0.04; interocular distance 1.06 ± 0.03; antennal segments: I 0.38 ± 0.03, II 1.47 ± 0.04, III 1.52 ± 0.04, IV 1.84 ± 0.05; rostral segments: I 0.57 ± 0.04, II 0.64 ± 0.03, III 0.37 ± 0.04, IV 0.43 ± 0.04; pronotum length 0.86 ± 0.07; humeral width 3.34 ± 0.08; frontal width 1.98 ± 0.1; femur 2.30 ± 0.06; tibia 2.47 ± 0.06; tarsi: I 0.43 ± 0.04, II 0.70 ± 0.04.

Fourth Instar (Fig. 7). Oval, slightly convex dorsally; maximum width through abdominal segment II. Head, thorax, lateral, and middle plates yellow-orange with brown punctures; lateral margin of pronotum, mesonotum, and metanotum dark brown; posterior part of eyes white; coxa, femur, and tibia red-orange; tarsi yellow.

Head. Juga longer than tylus; rostrum extended to mesocoxa. *Thorax.* Anterior margin of pronotum concave; lateral margins straight and slightly serrated; posterior margin sinuated; mesonotum with round lateral margins covering part of metanotum. *Hemelytra.* Wing pads evident, wider than long, reaching abdominal segment II; scutellum extended to base of metanotum; metasternal spine evident extended to mesosternum and with small middle grove; first abdominal lateral plate almost completely covered by wing pads. *Allometries* (N = 10). Body length 8.92 ± 0.24; body width 6.44 ± 0.14; head length 1.22 ± 0.04; head width 2.22 ± 0.07; interocular distance 1.25 ± 0.03; eye-ocellus distance 0.22 ± 0.04; antennal segments: I 0.46 ± 0.03, II 1.82 ± 0.03, III 1.90 ± 0.05, IV 2.42 ± 0.07; rostral segments: I 0.76 ± 0.03, II 0.86 ± 0.04, III 0.40 ± 0.06, IV 0.53 ± 0.05; pronotum length 1.29 ± 0.08; humeral width 4.83 ± 0.09; frontal width 2.40 ± 0.12; scuteller length 1.41 ± 0.06; scutellar width 3.78 ± 0.15; femur 3.08 ± 0.08; tibia 3.17 ± 0.05; tarsi: I 0.66 ± 0.05, II 0.87 ± 0.03.

Fifth Instar (Fig. 8). Oval, convex dorsally, and flattened ventrally; maximum width through abdominal segment II. Pronotum, scutellum, wing pads, metanotum, and middle abdominal plates with dark brown punctures. Lateral margin of pronotum, anterolateral margin of wing pads, and lateral margin of conexivum red. Rest of body yellow. Anterior part of juga and tylus red. Red line on posterior margin of lateral plates I–IV. Posterior margin of segments VII and VIII red. Antenna yellow, segment IV with distal half pale brown; eyes and ocelli red, posterior region of eyes white to pale yellow. Coxa, femur, and tibia yellow-orange; apex of femur and base of tibia red; apex of tibia brown; tarsi yellow-brown. *Head.* Juga longer than tylus and joined in front of it; bucculae slightly elevated, covering part of rostral segment I; rostrum extended to apex of metasternal spine *Thorax.* Wing pads extended to abdominal segment III; scutellum longer than wide, extended to base of abdominal segment II; with or without a mesosternal groove in which last rostral segment rests; metasternal spine extended to mesocoxa and either long with a middle longitudinal groove and sharp apex or flat with bald apex; in both cases reaching the mesocoxa. *Abdomen.* Abdominal segment I covered almost completely by wing pads; lateral plates not evident; middle plates evident as more sclerotized areas; spiracle and trichobothria on sternites II-VIII, those on sternite very small; female nymphs with sternite VIII divided by longitudinal line. *Allometries* (N = 10). Body length 11.79 ± 0.24; body width 7.78 ± 0.12; head length 1.48 ± 0.04; head width 2.64 ± 0.05; interocular distance 1.49 ± 0.04; eye-ocellus distance 0.26 ± 0.04; antennal segments: I 0.54 ± 0.03, II 2.18 ± 0.05, III 2.28 ± 0.06, IV 2.46 ± 0.07; rostral segments: I 1.02 ± 0.04, II 1.12 ± 0.05, III 0.55 ± 0.05, IV 0.66 ± 0.05; pronotum length 2.15 ± 0.06; humeral width 7.29 ± 0.06; frontal width 2.98 ± 0.9; scutellar length 2.57 ± 0.1; scutellar width 6.0 ± 0.17; femur 4.03 ± 0.1 ; tibia 4.01 ± 0.01; tarsi: I 0.79 ± 0.02, II 1.10 ± 0.09.

Adult (Figs. 9–10). When killed in alcohol, pale yellow, bright green in nature. Eyes red-brown, ocelli red; posterolateral angles of abdominal segments III–VII of males and females and posterior angles of paratergite VIII and IX of females with a black spine; hemelytra translucent; distal half of claws black; sternite III–VI with irregular red-yellow spots around middle spine; spine of sternite III red-yellow and short, joined to the bifid metathoracic spine. *Head.* Wider than long, triangular, inserted in pronotum; surface almost smooth with few striae; width through eyes no greater than

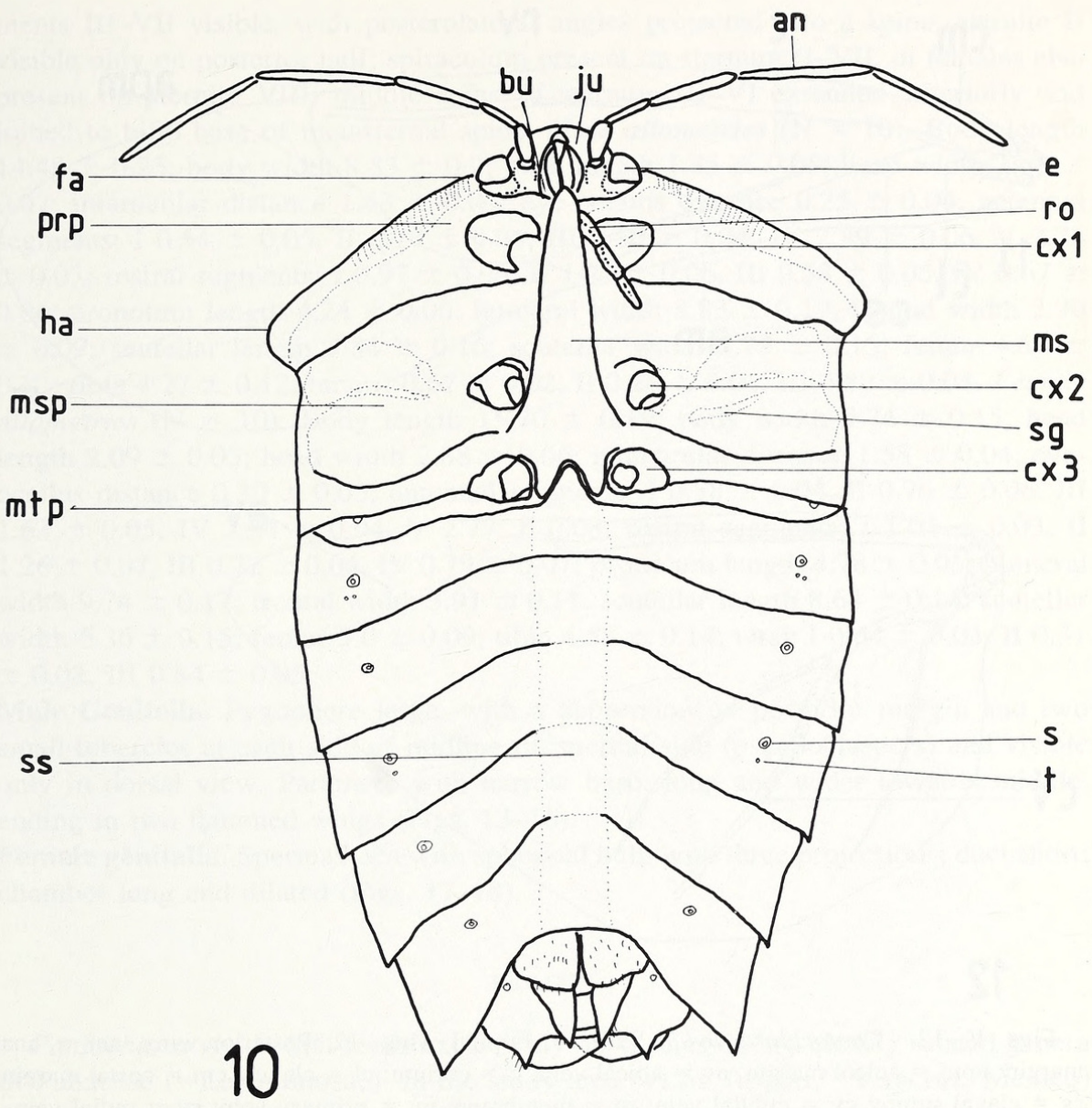
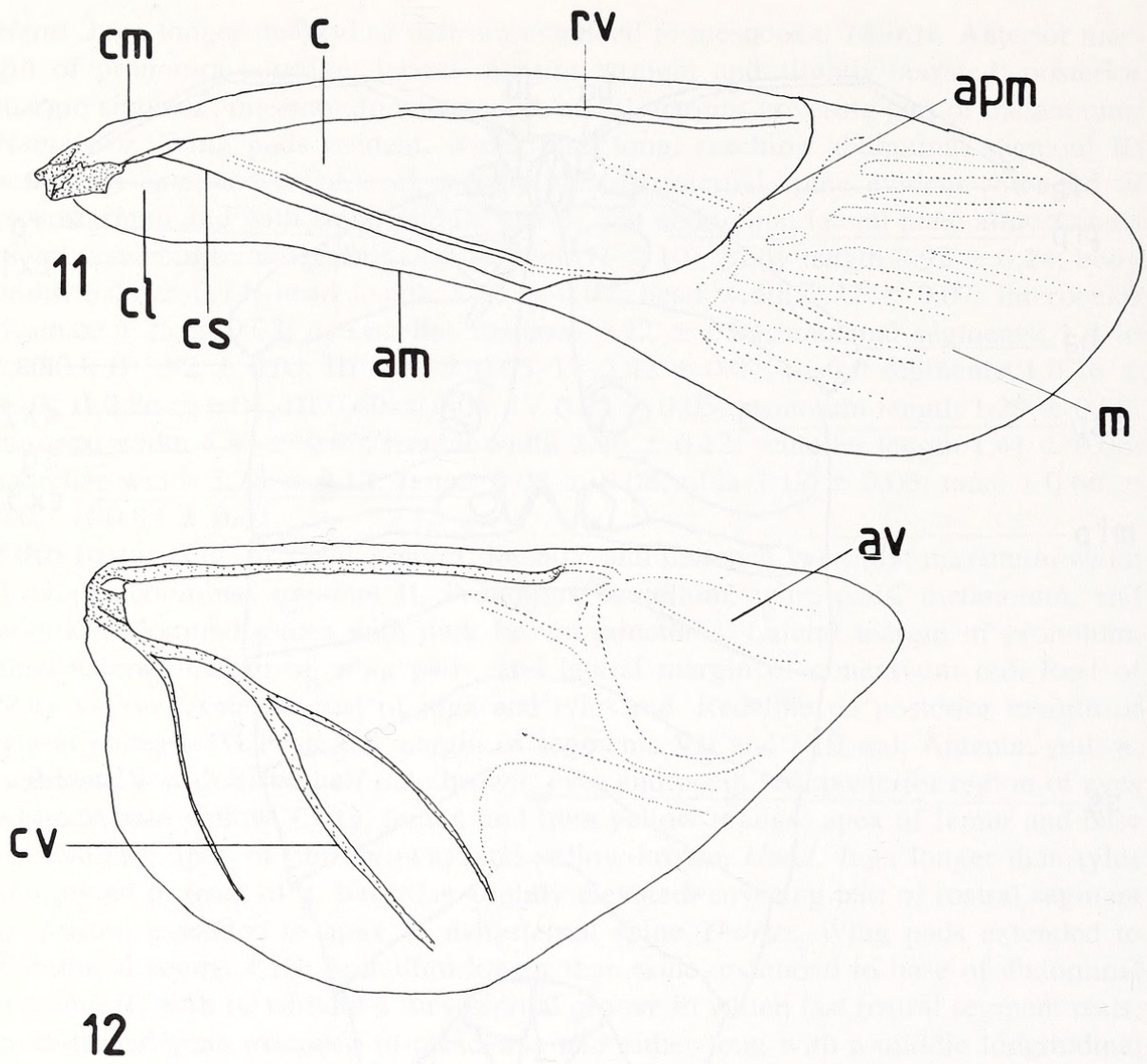


Fig. 10. *Pantochlora vivida* Stål. Ventral view of adult. an = antennae; as = abdominal spine; bu = bucculae; cx1 = procoxa; cx2 = mesocoxa; cx3 = metacoxa; e = eyes; fa = frontal angle; ha = humeral angle; ju = jugum; ms = metasternal spine; msp = mesopleura; mtp = metapleura; prp = propleura; ro = rostrum; s = spiracle; sg = senescenct gland; ss = sternal spine; tr = trichobothria.

width through frontal angles; antennal segment I similar or slightly longer than juga, juga longer than tylus and apically rounded; dorsal surface of head with small elevation near base of tylus, sometimes extended to the posterior end of head; eyes kidney shaped; ocellus small, located near border of the elevation of head, distance between ocelli bigger than distance between them and eyes; antennal tubercle short; bucculae well developed, triangular and almost completely obscuring rostral segment I; rostrum directed to one side of metathoracic spine. *Thorax.* Pronotum wider than long; anterolateral margins slightly elevated, without punctures and slightly striated on anterior half near lateral margin; rest of pronotum densely punctate; frontal angles



Figs. 11–12. *Pantochlora vivida* Stål. 11, Frontal wing. 12, Posterior wing. am = anal margin; apm = apical margin; av = apical vein; c = corium; cl = clavus; cm = costal margin; cs = claval suture; cv = cubital vein; m = membrane; pv = primary vein; rv = radial vein.

ending on small spine with round apex; humeral angles exposed slightly sharp; posterolateral margin slightly sinuated; anterior and posterior margins scarcely concave; posterolateral angles sharp, forming a small projection that usually covers part of scutellum and clavus; striated surface of anterolateral margin bent downwards, giving a rounded appearance; propleura, mesopleura, and metapleura densely punctate; orifice of metathoracic peritreme elongated almost reaching border of metapleura; evaporative area encompassing three quarters of metapleura; metasternal spine basally bifid, compressed dorsoventrally near metasternum, slightly elevated near mesosternum, reaching maximum height around procoxae and ending near base of head; legs without spines, foretibia slightly sulcate. Scutellum triangular, longer than wide, reaching abdominal segment VII, and slightly constricted at posterior half. *Hemelytra.* Corium without apparent venation; corium and clavus densely punctate; hemelytral membrane with numerous veins (Figs. 11–12). *Abdomen.* Conexival seg-

ments III–VII visible, with posterolateral angles projected into a spine; sternite II visible only on posterior half; spiraculum present on sternum II–VII, in females also present on sternite VIII; middle spine of sternum III–VI extended anteriorly and joined to bifid base of metasternal spine. *Male allometries* (N = 10). Body length 14.48 ± 0.25; body width 8.83 ± 0.2; head length 1.85 ± 0.05; head width 2.68 ± 0.07; interocular distance 1.43 ± 0.04; eye-ocellus distance 0.25 ± 0.04; antennal segments: I 0.54 ± 0.05, II 0.77 ± 0.05, III 1.50 ± 0.04, IV 2.39 ± 0.06, V 2.73 ± 0.07; rostral segments: I 0.97 ± 0.05, II 1.21 ± 0.06, III 0.58 ± 0.05, IV 0.67 ± 0.06; pronotum length 4.24 ± 0.06; humeral width 8.83 ± 0.19; frontal width 2.90 ± 0.09; scutellar length 7.84 ± 0.16; scutellar width 5.73 ± 0.15; femur 4.67 ± 0.12; tibia 4.27 ± 0.12; tarsi: I 0.67 ± 0.02, II 0.28 ± 0.01, III 0.80 ± 0.04. *Female allometries* (N = 10). Body length 15.70 ± 0.19; body width 9.74 ± 0.15; head length 2.09 ± 0.05; head width 2.88 ± 0.06; interocular distance 1.58 ± 0.04; eye-ocellus distance 0.30 ± 0.05; antennal segments: I 0.58 ± 0.04, II 0.76 ± 0.06, III 1.63 ± 0.05, IV 2.54 ± 0.04, V 2.77 ± 0.08; rostral segments: I 1.03 ± 0.03, II 1.26 ± 0.07, III 0.72 ± 0.06, IV 0.79 ± 0.07; pronotum length 4.78 ± 0.05; humeral width 9.74 ± 0.17; frontal width 3.91 ± 0.11; scutellar length 8.64 ± 0.14; scutellar width 6.36 ± 0.15; femur 5.0 ± 0.09; tibia 4.58 ± 0.14; tarsi: I 0.64 ± 0.03, II 0.31 ± 0.02, III 0.84 ± 0.05.

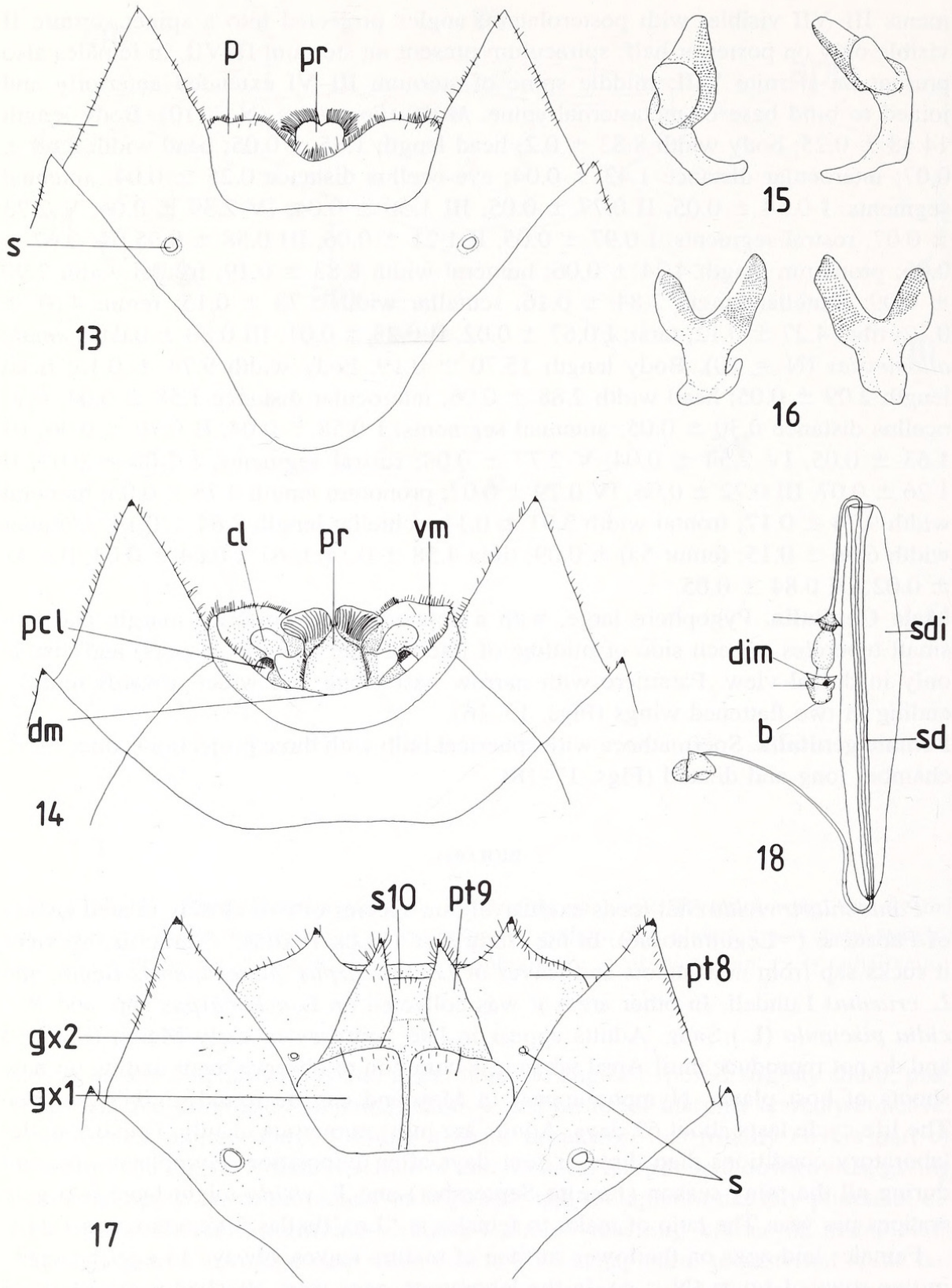
Male Genitalia. Pygophore large, with a depression on posterior margin and two small tubercles at each side of midline of internal side (pseudoclaspers) and visible only in dorsal view. Paramere with narrow base, long and wider towards middle, ending in two flattened wings (Figs. 13–16).

Female genitalia. Spermatheca with spherical bulb with three projections; duct short; chamber long and dilated (Figs. 17–18).

BIOLOGY

Pantochlora vivida Stål feeds exclusively on species of two closely related genera of Fabaceae (=Leguminosae). In the study area ("Los Tuxtlas," Veracruz, Mexico) it sucks sap from new shoots and leaves of *Lonchocarpus guatemalensis* Benth. and *L. cruentus* Lundell. In other areas it was collected on *Lonchocarpus* spp. and *Piscidia piscipula* (L.) Sang. Adults appear in late February or early March (Fig. 19) and do not reproduce until April when it is common to observe them mating on new shoots of host plants. Nymphs appear in May and can be found until September. The life cycle lasts about 62 days. Adults are most numerous in July. Females under laboratory conditions died three or four days after oviposition. Nymphs are present during all the rainy season (June to September) and *P. vivida* might have two generations per year. The ratio of males to females at "Los Tuxtlas," Veracruz was 1.24:1.

Females laid eggs on the lower surface of mature leaves, always 14 eggs arranged in two rows of seven (N = 6). In the laboratory, eggs were attached to the walls of the container and arranged similarly. After hatching, the first-instar nymphs remained near the eggs without feeding or moving. Second instars moved to new leaves and began to feed. Fifth instars dispersed over the plants and sucked sap from new shoots. When disturbed, nymphs expelled a white substance through their anus or fell to the ground and feigned death.



Figs. 13–18. *Pantochlora vivida* Stål. 13, Terminal abdominal segments of male (ventral view). 14. Terminal abdominal segments of male (dorsal view). 15–16, Different angles of male paramere. 17. Terminal abdominal segments of female (ventral view). 18. Spermatheca. b = bulb; cl = clasper, dm = dorsal margin; dim = distal margin; gx1 = first gonocoxa; p = pygophore; pcl = pseudoclasper; pm = proximal margin; pr = proctiger; pt8 = paratergite 8; s = spiracle; sd = spermathecal duct; sdi = spermathecal dilation; s10 = sternum 10; vm = ventral margin.

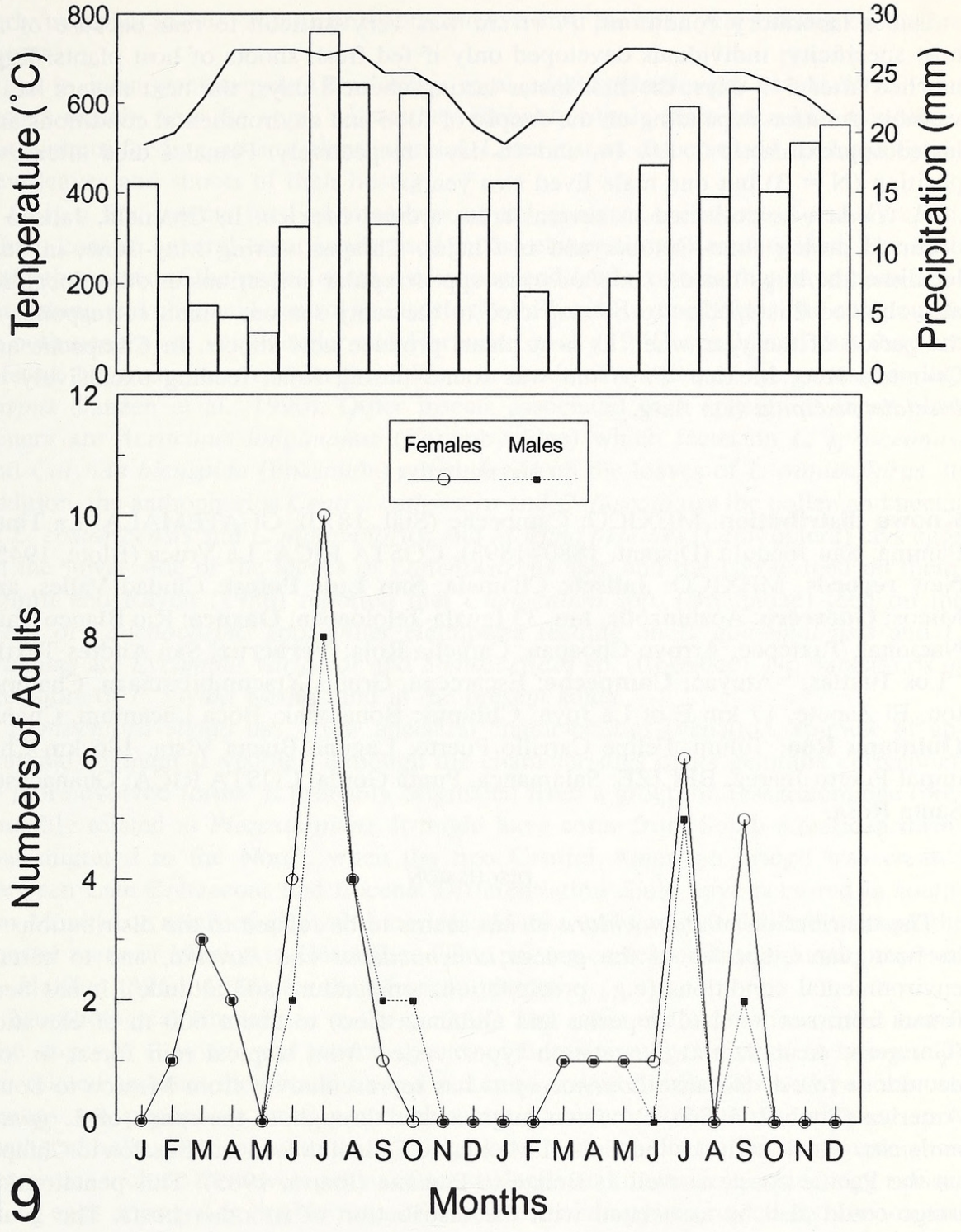


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Fig. 19. Numbers of adults of *Pantochlora vivida* Stål collected during 1985 and 1986 in "Los Tuxtlas", Veracruz, Mexico, and mean temperature and precipitation over the sampling period.

Under laboratory conditions, *P. vivida* was very difficult to rear because of its host specificity; individuals developed only if fed fresh shoots of host plants. Eggs hatched after 5–9 days, the first instar lasting about 8 days; the next instars had a variable duration depending on the supply of food and environmental conditions and lasted approximately 7, 10, 14, and 16 days, respectively. Females died after oviposition (N = 3) but one male lived two years.

P. vivida was collected in several areas around Mexico. In Chamela, Jalisco it occurred during June–October and in Chajul, Chiapas, during May–June; in both localities the bugs fed on *Lonchocarpus* spp. Irregular collections at other localities also showed this species to be restricted to the rainy season, which corresponds to the period of the year when its host plants produce new shoots. In Campeche and Quintana Roo, Mexico, *P. vivida* was found during June, feeding exclusively on *Piscidia piscipula* (L.) Sarg.

DISTRIBUTION

Known distribution. MEXICO: Campeche (Stål, 1870). GUATEMALA: La Tinta, Panima, San Joaquin (Distant, 1880–1893). COSTA RICA: La Vruca (Blote, 1945). **New records**. MEXICO: **Jalisco**: Chamela; **San Luis Potosi**: Ciudad Valles, and Micos; **Guerrero**: Acahuizotla, km. 33 Iguala-Teloloapan; **Oaxaca**: Rio Blanco Valle Nacional, Tuxtepec, Arroyo Choapan, Camelia Roja; **Veracruz**: San Andres Tuxtla, "Los Tuxtlas," Atoyac; **Campeche**: Escarcega, Grutas Xtacumbilxunaan, Champoton, El Zapote, 17 km E of La Joya; **Chiapas**: Bonampak, Boca Lacantum, Chajul; **Quintana Roo**: Tulum, Felipe Carrillo Puerto, Laguna Buena Vista, 146 km Chetumal-Puerto Juarez. BELIZE: Salamanca, Punta Gorda. COSTA RICA: Guanacaste, Santa Rosa.

DISCUSSION

The distribution of *Pantochlora vivida* seems to be related to the distributions of its host plants, species of the genera *Lonchocarpus* and *Piscidia,* and to certain environmental conditions (e.g., precipitation, temperature and altitude). It has been found from sea level (Campeche and Quintana Roo) to about 600 m of elevation (Guerrero, Acahuizotla). Vegetation types varied from tropical rain forest to low deciduous forest. Because *Lonchocarpus* has representatives from Mexico to South America (Ponhill, 1986), *P. vivida* might occur throughout the range of *L. guatemalensis,* which includes the Gulf of Mexico to Quintana Roo and Sinaloa to Chiapas on the Pacific coast, as well as Belize to Panama (Ibarra, 1985). This pentatomid's range could also be associated with the distribution of its other hosts. The genus *Piscidia* represented by seven species occurs in the north Neotropics. *Piscidia piscipula* is found in the Greater Antilles and eastern Mexico (Rudd, 1969).

Pantochlora vivida is found only in the area that Brailovsky (1985) proposed as the North American Neotropics, occupying the coastal areas of Mexico and tropical areas of the south of the country, reaching to northern Costa Rica.

In "Los Tuxtlas," Veracruz, the life cycle of *P. vivida* is clearly related to the rainy season when the temperatures are higher (June to October) (Fig. 19). The presence of two generations per year is possible because throughout this period its host plants produce new shoots, which are important for the development of the

early nymphal instars. Adults probably survive until the next year feeding on mature shoots.

As in most pentatomids (Brailovsky et al., 1987; Brailovsky et al., 1992, first instars remain near the eggs, where they probably obtain their microbial symbionts but without feeding on any plant material. Later instars disperse and feed mainly on new leaves and shoots of their hosts.

Only a few insects feed on members of the genera *Lonchocarpus* and *Piscidia,* which contain several compounds used in the elaboration of insecticides. The bark and other parts of the plants contain rotenone and isoflavonoids that have been used for fishing and chemical control of insects (Polhill and Raven, 1981). The compounds in both genera are very similar and Harborne et al. (1971) considered that they are related. No mammals feed on the foliage or seeds of species of the genus *Lonchocarpus* (Janzen et al., 1990). Other insects associated with species of these plant genera are *Acrocinus longimanus* (Cerambycidae) which feeds on *L. spruceanus,* and *Calynda bicuspida* (Phasmida) which feeds on the leaves of *L. minimiflorus.* In addition, the anthophorids *Centris aethyctera* and *C. fuscata* use the pollen and nectar of *L. costaricensis* and *L. minimiflorus,* and *Morpho peleides* (Lepidoptera) lays eggs on the lower side of the leaves of *Lonchocarpus* spp. and the larvae feed on them. Polhill and Raven (1986) reported that *Ctenocolum* spp. (Bruchidae) feed on the seeds of *Lonchocarpus* spp. Other Hemiptera feeding on *L. guatemalensis* and *L. cruentus* are *Lycambes varicolor* and *Stenoscelides* sp. (Coreidae). No parasitoids or predators of *P. vivida* were found in the present study.

Pantochlora vivida has a few ancestral characteristics (venation, spiracle of abdominal segment II visible), although the characteristics of its genitalia correspond to more evolved forms. It probably originated from a group of Tessaratomidae (presumably related to *Piezosternum*). It might have come from South American forms that migrated to the North, when the first Central American bridge was created between Late Cretaceous and Eocene. Differentiation could have occurred in southern Mexico or north of Central America and then have migrated north through the coastal areas of Mexico to Costa Rica. This pattern corresponds to the one proposed by Halffter (1964, 1976) for the Mexican plateau.

Morphological similarities in the genitalia and some characteristics of the immature stages of *P. vivida* and several species of Edessini suggest that these two groups are related and that they could have a common origin. Similarities between the two groups are pygophore with pseudoclaspers; paramere with similar shapes; spermathecal bulb spherical, with three elongations. Some analogies in ontogenetic characteristics include the development of scent glands and metasternal spine, egg masses of 14 eggs arranged in double rows of seven, the micropylar projections, corium and egg burster. Because of this series of characteristics, it is suggested that *Pantochlora vivida* be retained with Edessinae, as proposed by Rolston and McDonald (1979).

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