

as in tenth instar nymphs; posterior borders of sterna 6-9 weakly crenulated; subanal plate deeply cleft apically. Caudal filaments: cerci light brown, darker at base; proximal 2/3 of median filament yellowish brown; distal 1/2 of caudal filaments annulated; posterior 2/3 of caudal filaments with long brownish hair.

The eleventh instar molted after 16-18 days, averaging 17.6 days.

Twelfth Instar Nymphs (Fig. 14 D): Body length of male 6.80-8.90 mm; width of head 2.00-2.50 mm; thoracic notal shield: length 4.50-4.80 mm, width 5.90-6.80 mm; caudal filaments 2.10-2.50 mm. Body length of female 7.40-9.90 mm; width of head 2.20-2.60 mm; thoracic notal shield: length 4.30-5.70 mm, width 5.70-7.00 mm; caudal filaments 2.20-2.70 mm. Head: brown, except margins of genae and anterior projections of frontal process of head pale; head with numerous black tubercles; genae expanded, anterolateral corners of genae crenulated; anterior projection of frontal process of head as in Figure 14 D and 15 I, J. Compound eyes: grayish-black; eyes of males larger than females, almost occupying the entire dorsal area of the head. Ocelli obscured. Antennae: pale, basal segments darker; 9-segmented; antennal socket ringed with brown. Mouthparts (Fig. 15 A-F): labrum light brown (Fig. 15 B). Outer surface of mandibles with brownish papillae; left mandible as in Figure 15 A; molar surface of mandibles with 12-14 teeth; a sclerotized reddish-brown projection at base of molar area. Maxillae pale, except pectinate spines and teeth at distal margin of galea-lacinia reddish-brown; shape of pectinate spines and teeth of distal margin of galea-lacinia as in Figure 15 C,F; segment 2 of maxillary palpi subequal a little longer to 1 1/4 length of segment 1; segment 3 of palpi subequal in length to segment 2, apex acute; hair on maxillae as in Figure 15 C. Lingua of hypopharynx oval with minute setae along anterior margins; superlingua of hypopharynx as in Figure 15 D, with a row of long hairs along anterior margin. Labium light brown, except glossae darker: segment 2 of labial palpi 2/3 length to a little shorter than segment 1; segment 3 of palpi 1/3 length of segment 2; inner margin of distal corner of segment 2 finger-like; glossae as in Figure 15 E, anterior margin with minute hair, inner surface of glossae near distal margin with pectinate hairs; paraglossae as in Figure 15 E, with long hairs at lateral and anterior borders, inner surface of paraglossae near distal margin with spine-like hairs as in Figure 15 E. Thorax: thoracic notal shield brown, with numerous black tubercles, notal shield of males with fewer dark brown tubercles than those of the females; elevation of median carina and dorsal spines of thoracic notal shield as in Figure 13 XII, lateral borders of notal shield crenulated, serrated at base of lateral spines; lateral spines yellowish-brown at apex; lateral projections of notal shield as in Figure 14 D. Hind wing pads as in Figure 12 F; basal 1/3 of hind wing pads of newly molted nymphs reddish-brown, otherwise reddish-black, curled. Sterna light brown, with small black tuberculated setae; prosternum concave, posterior 1/4 of lateral borders indented to receive median coxal spur. Legs (Fig. 15 G,H): brownish-yellow except coxae brownish; outer surface of coxae and femora with black tubercles; a prominent dark brown macula near base on dorsal surface of tibiae; tarsi with a median, transverse, dark brown band; inner margins of tibiae and tarsi with one row of spines; tarsal claws as in Figure 15 H; reddish-brown at apex. Gills (Fig. 16): gill 1 as in Figure 16 A; dorsal portion of lamella long, pointed at posterior margin; ventral portion of lamella consists of ramified tracheal branches; tracheae grayish. Gill 2 as in Figure 16 B, with lamella flattened and expanded; gill 2 forms a protective covering for gills 3, 4, and 5. Gill 3 as in Figure 16 C; dorsal portion of lamella pointed at posterior margin; ventral portion of lamella consists of ramified tracheal branches arranged linearly along inner lateral border. Dorsal portion of lamella of gill 4 blunt at posterior end, tracheal branches as in Figure 16 D. Gill 5 as in Figure 16 E, shape as in gill 4. Gill 6 reduced, oval with the posterior 1/2 transparent and membranous as in Figure 16 F; gill 6 fits exactly into the concavity formed by the surface of the posterior elevation of the median carina and the dorsal groove of the pyramidal structure on tergum 6 (Fig. 20 A,B). Abdomen: terga 1-5 pale, completely concealed under thoracic notal shield; posterior 1/2 of tergum 6 dark brown with black tuber-