that species in much larger size, wider sutures, and earlier appearance of the median row of tubercles. In diameter, this is the largest of our known local Triphoras; in length, it is exceeded only by the more slender and very differently ornamented *Triphora callipyrga* Bartsch, which sometimes attains a length of 11 millimeters. The writer takes pleasure in naming this interesting species for George P. Kanakoff, through whose efforts these collections were obtained.

Los Angeles County Museum.

FOSSIL ARTHROPODS OF CALIFORNIA

15. SOME HEMIPTERA FROM THE McKITTRICK ASPHALT FIELD

By W. DWIGHT PIERCE

The great abundance of aquatic Hemiptera in the McKittrick deposit is of interest, especially because many of the insect bodies are more or less intact. These will assist in the determination of the fragments found in the Rancho La Brea Asphalt. As was stated in the preceding article, the writer has dropped the idea of an ancient lake, and is inclined to the theory that these insects were either trapped by alighting on active flowing sheets of shining tar, or by swimming in pools of water lying on top of active liquid tar. That there were at least temporary pools is attested by damsel fly larval remains.

In this and all other studies of tar field insects, it is the writer's purpose to give a new and modern interpretation of the anatomy, using as far as possible the Snodgrass nomenclature. In many ways this will differ from the classical terminology used in the Hemiptera. In this order it has been difficult to find articles dealing with the morphology of parts other than head, wings and genitalia. The paleoentomologist is not always privileged to have these parts. He must classify his fragments, no matter to what part of the skeleton they belong. The heads and thoraces of the water Hemiptera are very interesting, and illustrate great modifications for the purpose of water navigation.

Paleontological research in entomology has only one counterpart, and that is the study of fragments found in bird stomachs,

and in the excreta of birds, mammals, and reptiles. While a great deal of work has been done in this latter field, the workers did not leave any record of their morphological findings.

It is the purpose in the present series to point out those facts that will assist future workers.

The thorax is a dominant part of the remains. Its structure is therefore a criterion for placing the fragment in its order. The primitive orders of insects, belonging to the old grouping Thysanura, have the thoracic segments subequal and non-agglutinate. After the evolution of wings it was necessary to strengthen the thorax and this was accomplished in several ways.

In the first group, the prothorax is independent, and more or less emphasized, and the meso-and metathorax are agglutinate. To this group belong the Mallophaga, Isoptera, Embiida, Corrodentia, Plecoptera, Orthoptera, Phasmida, Blattariae, Mantodea, Hemiptera, Homoptera, Thysanoptera, Dermaptera, Coleoptera, Rhaphidodea, and Neuroptera.

In the second group prothorax is much reduced, and meso-and metathorax are strengthened. Of these, the parts of the thorax are all independent in Aleurodoptera, and Strepsiptera, with the metathorax strongly developed in the latter. In the second section of this group the entire thorax is agglutinate in Odonata and Ephemerida among the hemimetabolous insects; and in the holometabolous insects the mesothorax is dominant with only mesothoracic wings in Diptera and Coccoptera; while the metathorax is dominant in the wingless Siphonaptera, and the winged Mecaptera, Megaloptera, Trichoptera, Lepidoptera, and Hymenoptera. In the last order the first abdominal segment is also agglutinate.

The Hemiptera fragments found in the Bessom material bring out a number of interesting features. The head and prothorax in all five families (Notonectidæ, Corixidæ, Belostomatidæ, Nepidæ, Gerridæ) separate from the meso-metathorax. The heads are very distinctive: head flattened against prothorax and eyes inset in Notonectidæ and Corixidæ; but eyes protuberant in Gerridæ, Nepidæ, and Belostomatidæ. The Corixid head is like a closed disk with only a small opening for attachment to the prothorax; while the Notonectid head is broadly open behind. In the Nepidæ, at least Ranatra, there is a distinct neck, although this is not apparent except on dissection, or when found as in the tar. The Notonectid, Corixid, and Belostomatid pronota extend back as a covering over considerable part of the mesonotum, while the sternal portion is very small. The Nepid thorax as found in Ranatra is a dominant segment, with only the posterior portion extending over the mesonotum; the front legs are almost adjacent to the tiny head, and the bulk of the prothorax extends far to the rear. In the Gerridæ an unusual feature results from the union

of the mesonotum with the prothoracic ring, so that the cleavage line separates almost all the mesothoracic covering. Finding an elongate meso-metathoracic shell with the dorsum missing is a clue to its position in the Gerridæ. This feature and the broader separation of metathoracic coxæ separates the thoraces of *Gerris* from *Ranatra.*

The present paper contains the studies only of the Notonectidæ and Nepidæ. The others will follow in a later contribution.

FAMILY NOTONECTIDÆ

The back swimmers of the family Notonectidæ were present in great numbers at McKittrick, but careful study of the fragments from the 4 foot level at Site 4 indicates only one species belonging to the subgenus *Paranecta,* genus *Notonecta.* From the numerous fragments, almost all of the characters of the species can be elucidated. In fact a number of specimens were almost complete.

These insects are called back swimmers because they swim at the surface with the venter up. They inhabit ponds, lakes, and stagnant pools. They are predaceous upon other insects, grasping their prey with the front legs while they suck the blood. The hind legs are used as oars.

Fortunately there is a beautiful monograph of the genus *Notonecta* for the World by Dr. H. B. Hungerford (Bull. Univ. Kans. 34 (5) :1-195,17 plates (5 colored)).1933), and by study of this and the modern insects in the collection of the Los Angeles County Museum, I have determined that the insects from the 4 foot level of Site 4, McKittrick, are a new species.

It may be stated at this time that the genus *Notonecta* was also present in the Los Angeles La Brea deposits, but the material is more fragmentary and must be reported on later. It is unquestionably Pleistocene, because all of the recovered fragments come from the skull cavities of saber-tooth cats, found in Pits 3, 4, and 13.

The material upon which the following description is based includes more or less whole insects numbered McK 7a (holotype), McK 7b (paratype used in illustration), and McK 7g (male allotype); head and thorax, McK 7f; heads McK 7c, d, e. I have set aside under McK 7 as paratypes without letter, 9 bodies with head; one separated head and pronotum; 16 large body fragments without head; 12 wings, and 15 wing fragments (all unicolorous). The 7 heads included all measure 2.24 mm. width as in type. Only head McK 7e is larger, measuring 2.32 mm. Over 65 fragments

of Notonecta, all apparently of this species, were not used in the description, but are by virtue of their source all parts of the topotype series.

NOTONECTA (PARANECTA) BADIA, new species (Figures 4-9)

McKittrick, California, asphalt field, collected August 10, 1947 by Leonard Bessom, at depth of 4 feet in asphalt permeated silt.

Holotype Female (McK 7a): length 8.80 mm.; length of head 0.880 mm., prothorax 1.840 mm., scutellum 1.760 mm., inner line of clavus from scutellum to apex 2.160 mm. Width of head 2.34 mm., vertex in front 1.040 mm., synthlipsis 0.408 mm., thorax at base 2.960 mm., scutellum 2.560 mm.

Color very dark reddish brown or maroon; eyes, and scutellum black. It is believed that these are very close to the original colors, as in our experience insect colors are preserxed by tar. The wings are very dark, brown at base, becoming almost black at tip, but without any spotting. (Three spotted wings are being held for association with body fragments.)

The species runs in Hungerford's key near to *N. spinosa* Hungerford, and *N. unifasciata* Guérin, from both of which it differs by the coloration of the wings, and the male genital capsule.

Anterior margin of head with vertex slightly more convex than eyes; width of vertex to synthlipsis (distance between eyes at base) as 13:6 (Fig. 4). Face without any definite frontoclypeal demarkation (Fig. 5), except for a slightly raised clypeal zone almost reversing the shape of the labrum, which is broad at base, suddenly concavely narrowed, so that the base is to the apex as 14:3, roughly the form of a squat T. Beak with three joints beyond the labrum, of which the second and third are subequal and longer than the first.

Prothorax widening from apex to basal angles; with base strongly rounded; length to width as 23:38. Scutellum triangular, somewhat tapered toward apex, width to length as 32:22, base concave.

Female abdomen (Fig. 7) with fourth sternite wider at apex than the quadrate fifth, which is narrower at apex than the base of the sixth; sixth subtruncate at apex; its exact outline indeterminate. In *undulata,* which it most approaches in abdominal form the fourth sternite is narrower at apex than the base of the fifth.

The mesotrochanter has the outer angle produced and the mesofemur is spined near apex. The drawing (Fig. 6) of this area is from specimen McK 7b.

The male capsule (Figs. 8, 9) was extracted from specimen

McK 7g. It measured 1.52 mm. in length and 0.8 mm in depth. It might be described as a shell of a boat with two seats, the front seat being the 9th and 10th tergites, and the rear seat the cross bar of the aedeagus; behind which the claspers serve as rudders. The frame work is solid beneath with three upward processes on each side, and constitutes as a whole the sternite IX; the anterior processes are united by a non-chitinous band of tergite X; the median processes are broader and approach more closely, but are not united; the posterior processes are separated by a posterior cleavage and bend forward reaching to the median lobes. In the curve between the median lobe and the posterior clasper is an appendage called the harpagone. Within this capsule are the tenth or anal segment, which was not in good shape to study; and the aedeagus, of which a double longitudinal bar, and a basal crossbar are visible. In shape this capsule differs from all figured by Hungerford.

FAMILY NEPIDÆ

Insects of this family are quite rare in California, only one species of the genus *Ranatra* being reported, *R. brevicollis* Montandon, of which specimens are at hand from Los Angeles, and Claremont in Los Angeles County, and Santa Ana in Orange County. It was described from San Diego, and Hungerford reports it from El Dorado County; Lindsay (Tulare Co.), and Laguna Beach (Orange Co.).

It is therefore of considerable interest to report that at some distant period *Ranatra* of two species occurred in the now very dry country around McKittrick in the western foothills of Kern County.

In fact there are now at hand parts of 7 or at most 8 individuals, one head by itself, two thoraces with head, one thorax and abdomen without head, and three pronota. They are not all in fit condition for description and only three enter the description of *R. bessomi,* and one the description of *R. asphalti.*

The proportionate measurements vary greatly and it is possible that the genus was in great flux at the time this asphalt was laid down.

To show the variation the measurements of all specimens are given:

As a basis for the study we have Dr. H. B. Hungerford's excellent monograph of the Nepidæ of North America (1922. Kansas Univ. Sci. Bull. 14 (18) :425-470, 8 plates). In the material at hand there are no legs other than front coxæ and no genitalia, but all other characters used in the genus are available for study.

MEASUREMENTS OF RANATRA FRAGMENTS IN MILLIMETERS

Specimen	McK 11c	McK 11a	McK 11b	McK 11f	McK 11d	McK 11e	McK 12a
Species	R. bessomi holotype	R. bessomi paratype	R. bessomi paratype	R. bessomi paratype	R.	R.	R. asphalti holotype
	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Entire length	28.0						
Head complete		2.0					
Head visible				1.84			1.6
Pronotum	6.88				7.44	6.60	7.04
Pronotum to slit	4.28		4.96	4.80	4.76	4.44	4.12
Abdomen	15.80						
Prosternum	5.80		6.80		6.00	5.32	5.80
Mesosternum	2.68						2.80
Metasternum	1.48						1.92
Width head				2.72			2.12
Pronotum at apex	1.80		2.00	2.40	2.04	1.84	1.88
Pronotum narrowest	1.36		1.44	1.80	1.64	1.40	1.60
Pronotum at slit	1.80			2.20	2.08		1.80
Pronotum at base	3.04		2.16		3.60	2.80	3.20

Judging from the modern species at hand as well as the fossils, the relationship of the length of bucculæ to tylus (Figs. 10, 11, 13) is a good character. The sternal arrangement especially, in length of metaxyphus, and the presence (Fig. 19), or absence (Fig. 18) of delineation of the trochantin is of interest.

The writer has not found mention of the mesothoracic spiracles, which are at the edge of the prothorax, at base of mesoepisternum (Fig. 18), while the abdominal spiracles are on the pleurites of the segments.

Snodgrass (1947. The insect cranium and the "epicranial suture." Smithson, Misc. Coll. 107(7):1-52, 15 figs.) calls atten-

tion to the suture which defines the fronto-clypeal area. Hungerford in his illustration of the head of Ranatra does not indicate the existence of this suture, although it is distinct in all the specimens, modern and fossil, at hand. It is shown in Figures 10, 11, 13.

For the purpose of comparison Figure 10 illustrates the head of *R. brevicollis* as seen from above. This head is considerably larger than in either of the fossil species.

RANATRA BESSOMI, new species (Figures 11, 12, 16, 17, 18)

Described from one head (McK 11a), one headless body (McK 11c), one prothorax and head (McK 11f), three prothoraces (McK 11b, d, e) from Site 4, depth 4 feet, Leonard Bessom, collector of matrix.

Measurements of head: length as a whole 2.0 mm.; breadth 2.4 mm. The head (Figures 11, 12) is described from paratype McK 11a. By an unfortunate accident this delicate fragment broke into two parts just after completion of the drawings and is mounted in two cells on a slide. The head is slightly wider than long. The beak is missing. The antenna of the right side is present (Fig. 12), and is of the type of *R. nigra* Herrich-Schaeffer, an eastern species, and quite distinct from *R. brevicollis* Montandon, the only California species, which has a long lateral branch to the second segment, about half as long as the third segment. The antenna is three-segmented, the third joint cylindrical, tapering to apex, longer than either of the two preceding; second joint much enlarged on the inner side rather than on the outer side as in other species.

Head (Fig. 11) roughly cross-shaped, with axis of eyes at right angles to axis of head; eyes separated by more than their transverse width, which separates the species from *R. drakei* Hungerford. The epicranial suture or cleavage suture of Snodgrass separates the basal or occipital area medianly. In front of the faint line differentiating two surface sculptures the epicranial suture divides to form a broad ogival frontoclypeal area. This is longer than the eye stalks. The zone behind the eyes, and the narrow band enclosing the eyes is the parietal area. The frontoclypeus is called vertex in most Hemipterous literature, but the true vertex is only the narrow median part of the parietals. The anterior portion of the frontoclypeus is three lobed, with tylus in middle and juga at its sides. In front of the juga are the appendages called bucculæ, not extending forward beyond the tylus, as they do in *nigra,* and *brevicollis.* The juga have a dorsal line of punctures. The entire surface of frontoclypeus is minutely granulate, but this denuded condition is rarely seen in live freshly collected material.

Ventrally (Fig. 12) the eyes are much narrower than dorsally. The longitudinal axis is occupied by the strongly convex gular-submental column, which is basally deeply excavated. The arcuate postoccipital zone is indistinctly indicated and inserted in the convex true gula. This is laterally defined by distinct longitudinal sutures extending to the transverse depression bounding the occipital area from the genal area. In front of this depression the gular zone is more convex and narrower, and may be considered as submental in character, with the anterior narrowed portion between the bucculæ construed as mentum. The bucculæ are subacute at tip. The ventral genal area is quite broad, deeply depressed at sides of gula-submentum, the deepest part of the depression probably corresponding to the tentorial pits. At each side of the submentum are the jugal lobes, behind which are the attachments of the antennæ. These lie in the deep depression of the genæ at the sides of the submentum. Between base of eye and jugum is a deep depression cutting each gena, the continuation of the epicranial suture.

Prothorax (McK 11c) length dorsally 6.88 mm., to slit 4.28 mm., ventrally 5.80 mm.; width at apex dorsally 1.80 mm., at narrowest point 1.36 mm., at slit 1.80 mm., at widest point before base 3.04 mm. The narrowest point is at the middle of the dorsum. The tergum folds over the sides and a good part of the venter bounding the narrow sternum. The basisternite (Fig. 16), or area in front of the coxæ, has a low median longitudinal convexity; is quadrate and narrowly separated from the infolded tergum laterally by a narrow impressed episternal-epimeral piece to which the coxa is attached. The coxa swings forward in this groove. The sternum continues behind the coxal attachment in a narrowing band, which we may call sternellum. This is slightly convex, narrowly impressed at sides, by which character it resembles *R. kirkaldyi, R. nigra,* and *R. brevicollis,* and strongly differs from *R. buenoi.* The coxæ of this genus have only a pivotal attachment, and are very elongate, being 5.6 mm. long, with terminal attachment for trochanter.

Length of body exclusive of head 26 mm. (McK 11c, holotype) thus making total length of body about 28 mm. The mesonotum is covered by the extension of the pronotum, but the mesosternum (Fig. 17) is broad in front and narrowed between the coxæ, at the apex of which it is indistinctly truncate. The anterior part is the basisternite and is medianly impressed. The coxæ are subspherical, with broad round attachment to the cylindrically raised episternum-epimeron. From the lateral view (Fig. 18) the epimeral piece is clearly seen. At the base of the episternum is the broadly elliptical mesothoracic spiracle at the lower edge of two small pieces which must be considered epipleurites. The broad median plate of the metasternum is indistinctly sep-

arated from mesosternum. This is the metaxyphus, which is slightly raised above surrounding parts and narrows into a short prominence barely passing the base of the coxæ, by which it differs from *nigra* and *brevicollis*. At the sides of the basal portion of metaxyphus are two narrow lateropleurites. Extending from the mesoepipleurites to the abdomen is a large metæpipleurite outside the subcylindrical episternum, on which can be seen indistinctly the outline of the epimeron. The trochantin is not separated from sternellum as in *asphalti*.

The abdomen is long and slender and ventrally composed of five long segments, sharply angulate to the middle, with pleuræ depressed. The overfolded tergites slightly surpass the corresponding sternites. Segments 2, 3, 4 bear round spiracles on the tergo-pleural margins each at about the anterior third. The last segment (male) tapers convexly to a point, thus having an ogival pyramidal aspect. On the median line the relative lengths of the segments is 40, 44, 43, 40, 32. The cerci are lacking.

RANATRA ASPHALTI, new species (Figs. 13, 14, 15, 19)

Described from one specimen (McK 12a) from the McKittrick asphalt field, Site 4, depth 4 feet. This specimen has head, thorax and basal portion of abdomen, without legs. The beak separated and is mounted in a cell on a slide.

Length of head as visible 1.6 mm., width 2.12 mm. Length of prothorax on median line 7.04 mm., to transverse crease 4.12 mm., prosternum 5.80 mm., mesosternum 2.80 mm., metasternum 1.92 mm. Width of prothorax at base 1.88 mm., at narrowest point 1.60 mm., at transverse crease 1.80 mm., at widest basal point 3.20 mm.

The head (Figures 13, 14) is considerably smaller than in *bessomi* or *brevicollis*. The bucculæ slightly surpass the tylus. The beak (Fig. 15) is 3-jointed, with the basal joint laterally constricted at the middle. The epicranial suture is sharply defined. The antennæ are biramous, the branch of the second segment terminating opposite the tip of the third. The mentum is short and sharply defined; submental column with sides parallel.

The mesosternum is as in *bessomi*, but the mesasternum is quite different and gives an excellent study of structure. One coxa is missing, showing that the coxal cavity is open behind The metaxyphus is broadly attached to the mesosternum between the mesocoxæ, gradually broadens to a point just before the metacoxæ, and then sharply narrows to a long process reaching to the posterior fourth of the coxæ. It is bordered in its broader portion by narrow strips, which may be called laterosternites; and in the posterior half by curved pieces which extend from the anterior to the posterior attachments of the coxæ, and are hence to

be considered as the trochantins. The tip of metaxyphus lies over the broader sternellum. The posterior epimeron is not well differentiated from episternum.

DESCRIPTION OF FIGURES

PLATE 5

FIG. 4. Dorsal view of *Notonecta badia* Pierce, length 9.35 mm., from McKittrick, Site 4, depth 4 ft.

FIG. 5. Face of *Notonecta bodia* Pierce.

FIG. 6. Middle legs of *Notonecta badia* Pierce, C—coxa, Em—epimeron, Es—episternum, F—femur, SII, III—sternites, Sp—spine, Tr—trochanter.

FIG. 7. Posterior legs and abdomen of *Notonecta badia* Pierce. F—femur, Mc—metacoxa, Mx—metaxyphus, PI, II, III, IV, V, VI—pleurites, S IV, V, VI—sternites, Tr—trochanter.

FIG. 8. Lateral view of male genital capsule of *Notonecta badia* Pierce, Ae—ædeagus, Cl—clasper, Ha—harpagone, S IX—sternite IX, TX—tergite X.

FIG. 9. Dorsal view of male genital capsule of *Notonecta badia* Pierce. Ae—ædeagus, Cl—clasper, Ha—harpagone, T IX, X—tergites.

PLATE 6

FIG. 10. Dorsal view of head of *Ranatra brevicollis* Montandon from Los Angeles. B—buccula, J—jugum, T—tylus.

FIG. 11. Dorsal view of head of *Ranatra bessomi* Pierce, from McKittrick Site 4, depth 4 ft., B—buccula, ES—epicranial suture, FC—frontoclypeus, J—jugum, Oc—occiput, Pa—parietal, T—tylus.

FIG. 12. Ventral view of head of *Ranatra bessomi* Pierce. A—antenna, AS—antennal socket, B—buccula, Ge—gena, Gu—gula, J—jugum, M—mentum, Oc—occiput, Poc—postocciput, Sm—submentum.

FIG. 13. Dorsal view of head of *Ranatra asphalti* from McKittrick Site 4, depth 4 ft.

FIG. 14. Ventral view of head of *Ranatra asphalti* Pierce.

FIG. 15. Lateral view of beak of *Ranatra asphalti* Pierce.

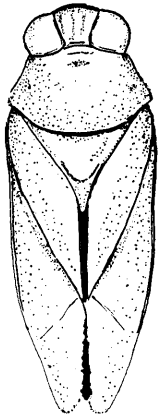
PLATE 7

FIG. 16. Ventral view of prothorax of *Ranatra bessomi* Pierce. BS—basisternite, C—coxa I, Es—episternum, Sl—sternellum, T—tergite I.

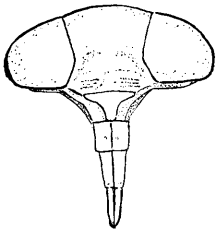
FIG. 17. Ventral view of meso- and metathorax of *Ranatra bessomi* Pierce, CC—coxæ, Ep—epipleurite, Es—episterna, Mx—metaxyphus, Pl—pleurite, S—sternite, Sl—sternellum, Sp—mesospiracle, T— trochanter.

FIG. 18. Lateral view of meso-metathorax of *Ranatra bessomi* Pierce. BS—masisternite, C—coxa, Em—epimeron, Ep—epipleurite, Es—episternum, Ls—laterosternite, Mx—metaxyphus, S—sternite, Sl—sternellum, Sp—mesospirac, W—wing.

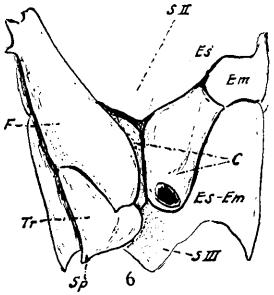
FIG. 19. Ventral view of metasternum of *Ranatra asphalti*, at double the scale used for Fig. 17, Cx—coxa, Em—epimeron, Ep—epipleurite, Es—episternum, Ls—laterosternite, Mx—metaxyphus, Sl—sternellum, Tn—trochantin.



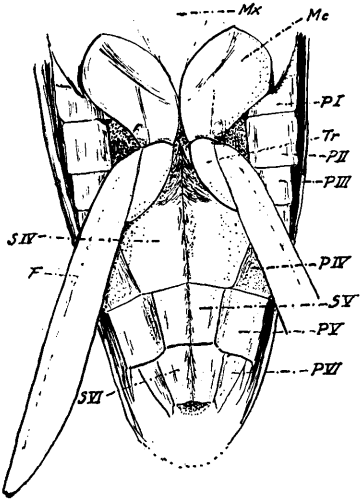
4



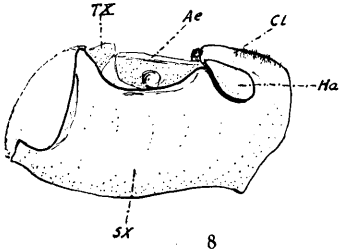
5



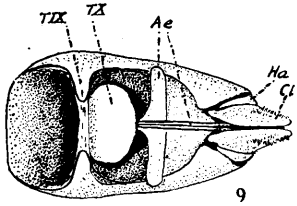
6



7

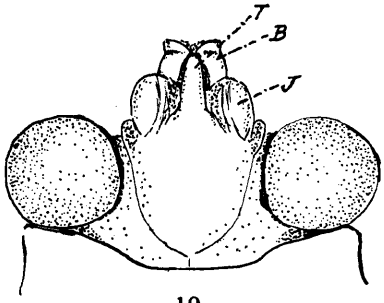


8

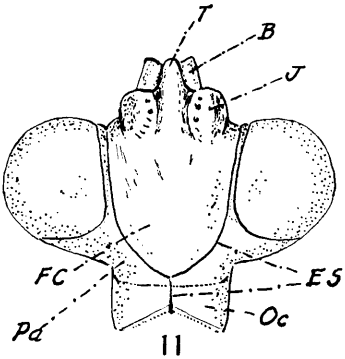


9

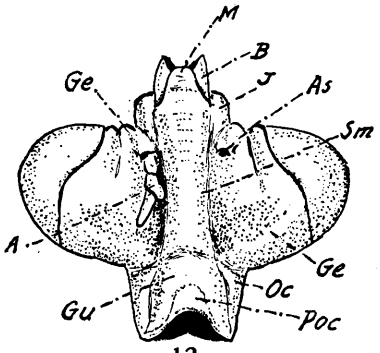
PLATE 5



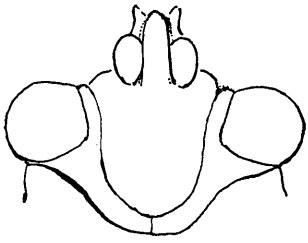
10



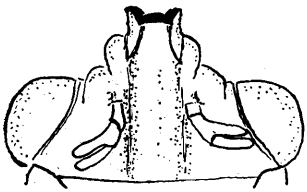
11



12



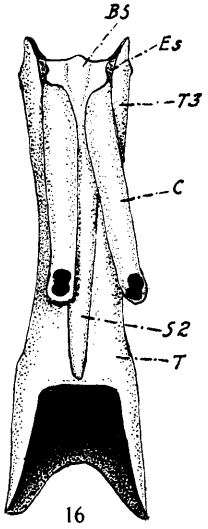
13



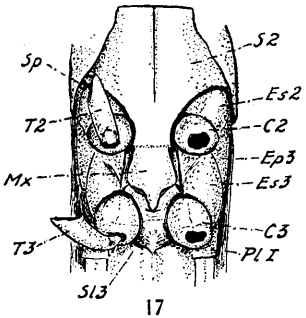
14

15

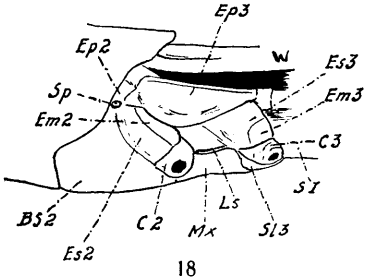
PLATE 6



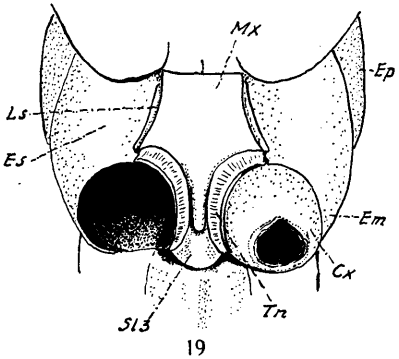
16



17



18



19

PLATE 7

FOSSIL ARTHROPODS FROM BRITISH COLUMBIA

By W. Dwight Pierce

1. INTRODUCTION

The present series of studies is designed to present the findings of Walter MacKay Draycot, of Lynn Creek, British Columbia. He has sent to the writer for study several collections of pieces of fossil interglacial lignite (Pleistocene), containing insect remains from two localities.

The first locality was originally found by Rev. Mr. Robert Connell years ago on the shore of Cordova Bay, Vancouver Island, and the first insects from the deposit were described by T. D. A. Cockerell in Canadian Entomologist 59:303-304, as *Donacia connelli* Cockerell, and *D. pompatica* Scudder.

Mr. Draycot visited this site with Mr. Connell in 1945.

Cockerell described the material as a "black lignite from the south end of Cordova Bay, Victoria. The deposit is overlain by 180 feet of clay, sand and gravel called the Cordova sands and gravels and the Maywood clays, the latter the older and both are known to be interglacial. Just above the lignite is a bed of marine shells, and below are finely stratified clays. The lignite contains pieces of wood, seeds, and other plant remains."

Cockerell discussed only the *Donacia* material but said that there were "also a few small black elytra which I have not attempted to determine."

Mr. Draycot wrote October 23, 1946 that to get to the deposit he had to take from Victoria, "the hourly-service bus to a point a mile from Cordova Bay deposits, climb down a steep bank, 180 feet high—and hope for the tide being out when I arrived." His description of the geology is to be found in the following paper.

The second locality is on the Mainland on the banks of Lynn Creek, near the post office of that name, outside of Vancouver; and the geology of the deposits is reported on by Mr. Draycot in the second article of this series.

The material he has sent is very interesting, and will have to be reported on in sections. The botanical material will be studied by paleobotanists. Most of the insect fragments are beetle elytra, some of them so perfect that, by careful work under a binocular microscope, they can be completely freed and mounted in a glass cell for study on both surfaces. Others are badly crushed and must be mounted in cells in the matrix. This crushing is particularly