THE NOTONECTIDAE (HEMIPTERA) OF BRITISH COLUMBIA

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A study of the Notonectidae in British Columbia has shown that six species are present in the Province. Distribution, habitat notes and a key to species is given below.

Subfamily **Notonectinae**

Notonecta borealis Bueno & Hussey. — Cariboo, Springhouse, 15. vii. 1962, 18. viii. 1962, 31. viii. 1962, 26. v. 1963 (G. G. E. Scudder); Chilcotin, 21. ix. 1963 (G. G. E. S.) [U.B.C.]. Hungerford (1933) records *N. borealis* from Michigan, Minnesota, Quebec and Bearfoot Mountains, B.C.: the latter record was repeated by Downes (1927). I have been unable to locate the Bearfoot Mountains locality, and so it is possible that this record refers to some neighbouring state or province.

To the above distribution, also can be added the Northwest Territories and Alberta. Material examined includes:- N.W.T., M. 37, Yellowknife, 21. vii. 1961 (T. G. Northcote); N.W.T., M. 10. 5, Yellowknife, 21. vii. 1961 (T. G. N.); N.W.T., trib. to Birch Lake, 4 mi. E. Birch Lake at mi. 74 E. of Fort Providence, on Ft. Providence—Fort Rae Hwy., 31. vii. 1961 (C. C. Lindsey). ALTA., Hay River, 8 mi. N. of Meander River, 20. vii. 1961 (T. G. N.) [U.B.C.].

The specimens from near Birch Lake, N.W.T. and Hay River, Alta. were taken in slow flowing rivers. At the former the river was 10 feet wide, 4 feet deep and with a weed bed at margin; at the latter, the river was 80 feet wide, 2 feet deep and the bottom was mud with small stones and some *Potamogeton*. In contrast to this, the B.C. specimens were taken in small ponds.

The captures of *N. borealis* in the Interior of British Columbia, indicate that in this area, the species overwinters in the adult instar: Hungerford (1933) states that unpublished records of the species in Michigan, indicate that there it overwinters in the egg stage. The B.C. specimens were captured in small freshwater ponds, of less than an acre in extent and with a profuse growth of submerged and emergent vegetation. These ponds had a pH of 8.03 - 8.35, and a water conductivity of 300 - 1050 microhmos/cm. (equivalent to 0.0135 - 0.0525 % NaCl).

N. kirbyi Hungerf. — Comox, vii (J. L. Jones); Forbidden Plateau, vii; Malahat, viii (W. Downes); Metchosin; Saturna Is., v (J. Boone); 20 mls. S. Port Clements, iii (A. B. Acton); Hope, ii (G. H. Asche); Milner, v (K. Graham); Nancy Lake, Mt. Seymour, ix (R. E. Leech); Stanley Park, Vancouver, iv (G. G. E. Scudder); Vancouver, vii (H. B. Leech); Oliver, ix (J. Boone); Keremeos, ix (W. Downes); Olalla, viii (G. G. E. S.); Westbank, ix (W. D.); Enderby, vi (W. D.); Vernon, 29. iv. 1918, in flight on road (M. Ruhmann); Vernon, ix (H. B. L.), x (W. D.); Salmon Arm, v (H. B. L.); Quick, viii (G. J. Spencer); Nicola, vi (G. J. S.); Kamloops, vii-viii (G. J. S.); Edith Lake, viii; Savona, vii; Clinton, 6 mls. S., ix (G. G. E. S.); 13 ml. Lake, Dog Creek Rd, N. Clinton, x (H. B. L. & C. V. Morgan); 149 mile, Cariboo Hwy., ix (G. G. E. S.); Chilcotin, v-ix (G. G. E. S.); McIntyre Lake, Chilcotin, x (G. G. E. S.); Boitano Lake, Cariboo, v (G. G. E. S.); Westwick Lake, Cariboo, iv-ix (G. G. E. S.); Springhouse, Cariboo, iv-x (G. G. E. S.); Kootenay (Horseshoe Lake, New Lake), x (H. Sparrow); Fort St. John, vi (A. B. Acton) [U.B.C.]. Oliver, v (J. E. H. Martin); Peachland, x (A. N. Gartrell); Summerland, ix (A. N. G.); Westbank, v (A. Thrupp); Kaleden, xii (A. N. G.);

Kelowna, xi (A. N. G.); Creston, vii (A. A. Dennys); Princeton, v (P. N. Vroom); Lavington, vi. (A. Thrupp); Copper Mt., ix (G. Stace Smith); Minnie Lake, vii (N. Criddle); Clinton, v (R. Hopping); 134 mile, viii (R. Hopping); Barkerville, ix (G. Stace Smith); Revelstoke, 6000 ft., vii (E. R. Buckell); Courtenay, vii (J. G. Gregson) [C.N.C.].

Hungerford (1933) notes material in the C.N.C. from Mt. Cheam, iii; Rolla, viii (P. N. Vroom), Aspen Grove, v (P. N. Vroom), and reports the species as being confined to the western United States and Canada. Previous to 1933 *N. kirbyi* was confused with *N. insulata* Kirby.

In the B.C. Interior, *N. kirbyi* has been taken in a wide variety of lakes, with pH 7.03 - 9.23 and conductivity 60 - 6,800 microhmos/cm., but has not so far been taken in waters above 7000 microhmos/cm. (about 0.4% NaCl). Some preliminary measurements have been made on the haemolymph of this species: the results are tabulated below.

Lake	Osmolarity of lake water (osmoles)	Osmolarity of insect haemolymph (osmoles)
A	0.005	0.30
B	0.135	0.36
C	0.270	0.37

In Lake B there was 47 meq. Na/L and in the insect haemolymph 153 meq. Na/L (based on five insects pooled).

N. undulata Say.—Comox, vii (J. L. Jones); Colwood, x (W. Downes); Courtenay; Forbidden Plateau, 3000 ft., vii (Jones); Goldstream, vii (K. F. Auden); Lower Quinsam Lake, iv (in cop. 30. iv. 1960) (J. Lanko); Malahat, viii (W. D.); Metchosin, viii (W. D.); Nanaimo, v (G. J. Spencer); Saanich Distr., viii-ix (W. D.); Tofino, vi-viii (G. J. S.); Victoria, vi (K. F. A.); Agassiz, vii; Haney, ix (W. D.); Prince Rupert, muskeg pool (N. Carter); Nr. Squamish, viii (G. G. E. Scudder); Steelhead, ix (G. G. E. S.); Vancouver, x (D. C. Buckland); Oliver, viii (W. D.); Vaseaux Lake, viii (W. D.); Westbank, ix (W. D.); Keremeos, ix (W. D.); Kamloops, viii (G. J. S.); Sheridan Lake, ix; Williams Lake Distr., v (G. G. E. S.); Chilcotin, v-x (G. G. E. S.); McIntyre Lake, Chilcotin, x (G. G. E. S.); Green Timbers Plateau, vi-x (G. G. E. S.); Beaverdam Lake, Cariboo, x (G. G. E. S.); Springhouse, Cariboo, v-x (G. G. E. S.); Batholemew Lake, S. of Kimberley, v (I. Stirling); Kootenay (Horseshoe Lake,Jim Smith Lake, Enid Lake, Lillian Lake, Hiawatha Lake, Bednorski Lake, New Lake), x (H. Sparrow) [U.B.C.]. 134 Mile (R. Hopping); Vernon (R. Hopping) [F.I.S., Vernon]. Matson Lake, V.I., x (Downes & Hardy); Wellington, iii [Prov. Mus. Victoria]. Peachland, x (A. N. Gartrell); Salmon Arm, ix (A. Thrupp); Summerland, x (A. N. G.); Oliver, x (A. N. G.); Victoria, vi (K. F. A.) [C.N.C.]. Hungerford (1933) also gives Chilliwack, ix; Mt. Cheam, ix, and notes that *N. undulata* has a wide range, extending from coast to coast in North America and from Canada to the Gulf of Mexico.

In British Columbia, *undulata* seems to be relatively more abundant in the south than in the central interior, and is more common in the south-east, than is *kirbyi*. In the Cariboo and Chilcotin *undulata* and *kirbyi* frequently occur in the same lake. They have a similar range of salinity tolerance and haemolymph values appear identical.

N. spinosa Hungerf. — Oliver, 15. viii. 1937 (W. Downes); Vernon, 4. x. 1921 (W. D.), 13. ix. 1930 (H. Leech) [U.B.C.]. Kelowna, xi (A. N. Gartrell) [C.N.C.]. Downes (in litt.) reports this from slow flowing streams. It appears to be confined to the Okanagan Valley in B.C. Hungerford (1933) records the species from B.C., Oregon, Montana, Nevada and Utah.

N. unifasciata andersoni Hungerf. — Osoyoos, 29. iii. 1941 (H. B. Leech); Westbank, 12. ix. 1954 (W. Downes) [U.B.C.]. Oliver, v (A. N. Gartrell); Peachland, x (A. N. G.); Penticton, x (A. N. G.); Summerland, iv (A. N. G.); Vernon, vi (R. Hopping) [C.N.C.]. Like *spinosa*, apparently confined to the Okanagan Valley in B.C. This subspecies extends from B.C. through the Western United States to Mexico, the type locality being Oliver, B.C.

Subfamily **Anisopinae**

Buenoa confusa Truxal — Duncan, 4. ix. 1926 (W. Downes); Beaver Lake, Saanich Dist., 9. viii. 1919 (W. D.); Malahat, 30. viii. 1939 (W. D.); Sooke,19. viii. 1923 (K. F. Auden); Nr. Squamish, 25. viii. 1961 (G. G. E. Scudder); Oliver, 15. viii. 1957 (W. D.); Premier Lake, Kootenay, 4. ix. 1963 (I. Stirling). These constitute the first definite records of this species in the Province: material from Vancouver Island was recorded under *B. elegans* (Fieb). by Downes (1927). Truxal (1953) has shown that the North American specimens referred to *elegans* are incorrectly named, most of them being *confusa*.

B. confusa has a very interesting distribution in that it occurs only in the southern drier and warmer areas of the Province: it does not apparently penetrate far into the Interior, but also it is not confined to the Okanagan. The locality near Squamish is a very small road-side pond, with floating logs and a little vegetation. In August 1961 the species was abundant and both adults and larvae were captured. Truxal (1953) reports *confusa* from Alberta, Manitoba, eastern and southern United States and the West Indies. In the northern part of its range, specimens are larger than those to the south and the species seems to show a clinal type variation. Further, Truxal (loc. cit.) reports a variation in flight wing development in different populations. In Manitoba and Alberta 32% were short-winged, while those from Connecticut, Michigan, New York, New Jersey and Kansas were all short winged. Other states had varying percentages of short-winged individuals and the sample from the Grand Cayman Island was all long-winged. All specimens so far studied from British Columbia are short-winged and thus the reduced wing condition seems not to have a geographical basis. Perhaps it is related to habitat stability, similar to the conditions in Corixidae and other Notonectidae (Young, 1961, 1965; Scudder, 1964).

Key to Notonectidae of British Columbia

1. Hemielytral commissure with definite hair-lined pit on anterior end; hemielytra hyaline; fore tarsi of male with two tarsomeres; male fore femora widened at apex and with stridulatory area on inner surface; greatest width of head at least 7x width of vertex; pronotum tricarinate, the median carina distinct; synthlipsis narrow, less than half anterior width of vertex. ..... **Buenoa confusa** Trux
— Hemielytral commissure without definite hair-lined pit on anterior end; hemielytra opaque 2
2. Keel of fourth abdominal sternum bare, hairs confined to sides. 3
— Keel of fourth abdominal sternum not bare 4
3. Insects pale and more or less uniform ochraceous; anterior margin of corium sometimes narrowly fuscous; membrane and scutellum flavo-ochraceous; male genital capsule with distinct ventral finger-like process ..... **Notonecta borealis** B. & H.
— Insects usually distinctly marked with black; membrane fuscous in basal half; scutellum completely black; male genital capsule with slight ventral conical projection **N. kirbyi** Hung.
4. Mesotrochanter angulate or spinose 5
— Mesotrochanter rounded ..... **N. undulata** Say
5. Mesotrochanter produced into a long spine ..... **N. spinosa** Hung.
— Mesotrochanter angulate ..... **N. unifasciata andersoni** Hung.

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