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Crustacea of the Environs of St. John, New Brunswick, Canada

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Abstract. The following species of crustacea were collected in a survey of the environs of St. John, New Brunswick, Canada: *Crangonyx gracilis* Smith, *Gammarus duebeni* Lilly, *Gammarus lawrencianus* Bousfield, *Gammarus oceanicus* Segerstrale, *Gammarus tigrinus* Sexton, *Hyale nilssoni* Rathke, *Hyalella azteca* Sauss., *Jaera albifrons* Leach, *Marinogammarus finmarchicus* Dahl, *Marinogammarus obtusatus* Dahl and *Marinogammarus stoerensis* Reid: *Hyalella azteca* was the predominant species in purely fresh water lakes; *Gammarus tigrinus* predominated in fresh to brackish waters; and *Hyale nilssoni* appeared to be the dominant species from marine sources.

This discussion is based upon a paper entitled "A Report to the Provincial Department of Public Health, Province of New Brunswick, Fredericton, New Brunswick, Canada, on a Survey for Certain Crustacea of the Environs of St. John, New Brunswick, Canada", which was sent to the New Brunswick Provincial Health Department in January, 1967. The paper mentioned above was based upon an arthropod-mollusk survey conducted in the summer of 1962. Similar surveys were made in Canada before 1962 in the Yukon Territory and in the provinces of Alberta, British Columbia, Manitoba, Ontario, Quebec and Saskatchewan. After 1962 I made further biological survey in the Northwest Territories and in the provinces of Nova Scotia and Prince Edward Island. In the summer of 1967, floral and faunal surveys will be made in Quebec, Labrador and Newfoundland.

The report referred to above was divided into two parts. Part I, the preliminary report, cited the localities where organisms were collected, and gave an idea of the breadth and scope of the survey. Awareness of those areas from which specimens were not collected may be helpful to workers at a later date. Part II of the report present information pertaining to the crustacea that were collected.

THE SURVEY

Representatives of the following species of Crustacea were collected: *Crangonyx gracilis* Smith, *Gammarus duebeni* Lilly, *G. lawrencianus* Bousfield, *G. oceanicus* Segerstrale, *G. tigrinus* Sexton, *Hyale nilssoni* Rathke, *Hyalella azteca* Sauss., *Jaera albifrons* Leach, *Marinogammarus finmarchicus* Dahl, *M. obtusatus* Dahl and *M. stoerensis* Reid.

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In collections from fresh-water lakes, *Hyalella azteca* was the predominant species with one collection yielding *Crangonyx gracilis* in association with *H. azteca.*

In marine sources, *Hyale nilssoni* was predominant; however, *Gammarus lawrencianus, G. oceanicus, Jaera albifrons, Marinogammarus finmarchicus, M. obstatus* and *M. stoerensis* were found.

Gammarus tigrinus was found in waters varying from fresh to brackish. In addition, a river, possibly with some brackish content, yielded *Gammarus duebeni* in association with *G. oceanicus* and *G. lawrencianus.*

Collection areas and specimen types taken from each area are as follows:

1. Edge of Lily Lake near and north of the clubhouse, St. John area, New Brunswick: *Hyalella azteca, Crangonyx gracilis.*
2. Fisher Lakes near Lily Lake Road, St. John area, New Brunswick: *Hyalella azteca.*
3. Brothers Cove of Kennebecasis Bay near slip of Millidgeville Ferry at the foot of Millidge Avenue, Millidgeville, New Brunswick: *Gammarus tigrinus.*
4. Pool near the margin of Brothers Cove: *Gammarus tigrinus.*
5. Shores of Belmont Beach, Grand Bay, St. John River, New Brunswick: *Gammarus tigrinus.*
6. Westfield Ferry Slip, Westfield area, St. John River, New Brunswick: *Gammarus tigrinus.*
7. Shores of Kennebecasis Bay near Reeds Point Ferry Slip, New Brunswick: *Gammarus tigrinus.*
8. Wood Lake near the edge of highway 29, New Brunswick: *Hyalella azteca.*
9. Irish River near the junction of the road to Orange Hill and to Fairview, St. Martins, New Brunswick: *Gammarus duebeni, G. oceanicus, G. lawrencianus.* (See Fig. 1.)
10. West side of Dipper Harbour near wharf, Dipper Harbour Township area, New Brunswick: *Hyale nilssoni, Marinogammarus finmarchicus, Jaera albifrons.* (See Fig. 2.)
11. Rocks near Dipper Harbour wharf on the west side of the Dipper Harbour Township area, New Brunswick: *Hyale nilssoni.*
12. Bay of Fundy, Pocologan, near the B. D. Yerxa residence, New Brunswick: *Gammarus oceanicus, Marinogammarus stoerensis.*
13. Near the Letite Ferry landing, Passamaquoddy Bay, New Brunswick: *Marinogammarus obtusatus.*
14. Mascabin Point, Back Bay area, New Brunswick: *Marinogammarus finmarchicus.*
15. Back Bay near the Lewis Connors & Sons sardine factory,

Figure 1. Irish River.

Figure 2. Dipper Harbour.

Back Bay Township, New Brunswick: *Gammarus lawrencianus, G. oceanicus, Jaera albifrons.*

16. Bay of Fundy, breakwater and fishing boat anchorage, Lorneville, New Brunswick: *Marinogammarus finmarchicus, M.*

17. Bay of Fundy, Black Beach, New Brunswick: *Hyale nilssoni.*

18. Bay of Fundy, Mispec Park, New Brunswick: Hyale *nilssoni.*

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Biology

An excellent account of the biology of *Hyalella azteca* is given by Johnson (1960) who states that this crustacean, commonly referred to as a scud or side swimmer, has the widest geographical distribution of any fresh-water amphipod in North America. It is found in continental North America from Mexico to Alaska, in the Falkland Islands, and from the Caribbean Islands to the Pacific Coast. It normally inhabits shallow, fresh water ponds and lakes having a muck bottom. Streams may support a small population of these scuds but the current must be sluggish. These scuds are negatively phototropic and highly thigmotropic. Consequently they are found on the under side of leaves and debris. Exudates of crushed or wounded animal flesh elicit a positive chemotropic reaction. The diet of these animals is extremely varied. They are omnivorous grazers and scavengers. Leaves of fresh-water plants as well as algae are eaten. Scuds attack injured isopods and other wounded animals of comparable size. Freshly killed animals also are utilized as food. Cannibalism is common, especially under laboratory conditions. When cover is scant, scuds are commonly preyed upon by young bass (*Micropterus* spp.), sunfish (*Lepomis* spp.), perch (*Perca* sp.), pike and pickerel (*Esox* spp.), top minnows (Poeciliidae), stickleback (Gasterosteidae), and suckers (Catostomidae). Shore birds, ducks, particularly the shoveler (*Spatula clypeata*), and many of the salamanders include scuds as an important item in their diet. The chief *arthropod* predators include the nymphs of dragonflies and damselflies, the larvae and imagoes of water scorpions (*Ranatra* sp.), diving beetles (*Dytiscus* sp.), giant water bugs (*Belostoma* sp.), and back swimmers (*Notonecta* sp.). Many species of amphipods are used as food for fish in fish hatcheries. *H. azteca* serves as the intermediate host for a variety of parasites, particularly helminths. These helminths include the larvae of the cestode, *Proteocephalus ambloplitis,* from black bass; the trematode, *Plagisporus lepomis,* from fish; the nematodes, *Tetrameres crami* from ducks, *Rhabdocoma ovafilamenta,* from yellow perch; and the acanthocephalans, *Echinorhynchus* and *Leptorhynchoides thecatus,* from fish and from species of bass respectively. Several types of commensals are found attached to the surface of many

scuds. Suctorian and folliculinid protozoa are commonly encountered.

During Johnson's study many scuds were found to harbor a lush growth of a ciliate, *Epistylis plicatilis*, attached in great numbers to the dorsal surface of their exoskeleton and sometimes surrounding the region of the mouth. In central Iowa most of the lakes and ponds harbor large populations of scuds. A pond at Ledges State Park approximately 20 miles west of Ames (Iowa) was typically found swarming with scuds. They were present in abundance even when the ice was a foot thick. Pennak (1953) reports that *Hyalella azteca* and *Crangonyx gracilis* are widely distributed in unpolluted clear waters, including springs, spring brooks, streams, pools, ponds and lakes. *Hyalella azteca* is found at depths exceeding one meter, and sometimes occurs in alkaline and brackish waters. It is interesting to note that G. E. and Nettie MacGinitie (1949) report that although the genus *Hyalella* is said to be confined to fresh waters, these authors have taken an undescribed species of *Hyalella* from salt water on the beach at Ensenada, Lower California.

Bailey (1933) reports that *Crangonyx gracilis* (*Eucrangonyx gracilis*) was found to be abundant in a small cave several miles north of Mammoth Cave. Pennak (1953) reports that this species is an inhabitant of temporary as well as of permanent ponds and streams. It has been suggested that it tides over unfavorable conditions by burrowing into the substrate. *Crangonyx gracilis* has been also reported from caves or cave systems which contain brooks, streams and pools. Its food consists of bits of dead vegetation washed into the caves and the thin bacterial scum covering submerged areas. Vandel (1965) found that the fish *Amblyopsis* has been known to consume *Crangonyx*, small fish, *Cambarus*, *Asellus* and various copepods.

Sars (1895) reports that *Hyale nilssoni* has been found along the whole coast of Norway from the Christianiafjord up to Vardo, having himself taken it in several places on the west coast near ordinary tide mark between seaweed. It is very active and, when out of the water, makes abrupt leaps. It has been found on the Atlantic Coast of Europe and has been reported from the Azores and from the Adriatic. Ricketts and Calvin (1964) mention that *Hyale* is possibly the commonest low-tide hopper of the Monterey Bay region, and has been taken from the coastlines of Marin and San Mateo Counties in California.

Lucas (1840) reports that *Jaera albifrons* is very common in the midst of seaweed and under stones on the coasts of England. White (1857) also reports that it was found on the seacoast,

being very abundant among seaweeds and under stones in many parts of the British Isles. Ekman (1953) reports that it has been classified as a euryhaline marine animal of the Baltic fauna.

Stephenson (1935) reports on various aspects of the biology of *Marinogammarus*. *M. finmarchicus* Dahl (= *Gammarus* (*Marinogammarus*) *finmarchicus*) was found at Skjervφy, Norway, on the beach. *M. obtusatus* Dahl (= *Gammarus* (*M.*) *obtusatus*) has been reported from many localities in western and northern Norway, mostly all of these collections being taken on the beach. It has also been reported from Iceland, from north western Scotland, from northern France and from the Faroes. *M. stoerensis* Reid (=*Gammarus* (*M.*)*stoerensis*) was found on the beach in western Norway. This species was also reported from Stoer Bay on the west coast of Sutherland, northern Scotland, under stones in very shallow pools and under stones lying on coarse sand just above the low-water mark of ordinary spring tides.

Relative to the biology of *Gammarus duebeni*, Carpenter (1928) reports it as a brackish water species. Sars (1895) states that *Gammarus duebeni* was found in great abundance in brackish pools among the shore rocks lying considerably above high-water mark. It is here often associated with true fresh-water forms such as "*Daphnia pulex*" as well as with other crustacean brackish-water forms. Occasionaly *Gammarus duebeni* was also found at the beach beneath stones or decaying algae. It has been reported from Norway, the Cattegat, the British Isles, the Dutch coast, and from warm springs in southern Greenland. Chevreux and Fage (1925) report *Gammarus duebeni* from soft water as well as from brackish water at Calais, France. Stephenson (1935) reports that it has been found in fresh and brackish water. It also has been taken to a depth of only a few meters along the European coasts from the Murman coast in the U.S.S.R. to northwestern France and to the Gulf of Bothnia. It is seen in Great Britain in streams. It is rather common in the Faroes, both along the shores and in fresh water, even in rivulets and waterfalls more than 200 meters above sea level. It has also been reported from Ireland, Iceland, the Black Sea and from Canada, as well as from other areas mentioned in the discussion of this species. Ekman (1953) reports that *G. duebeni* is a brackish-water animal in the Baltic area. Nicol (1960) reports that the brackish-water *G. duebeni* shows a wide tolerance of concentrations from full strength to 2% sea water. Green (1961) reports that it is found on the western side of Britain in fresh water. It also appears to be restricted to brackish water in estuaries which have *Gammarus pulex* at the fresh-water end.

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