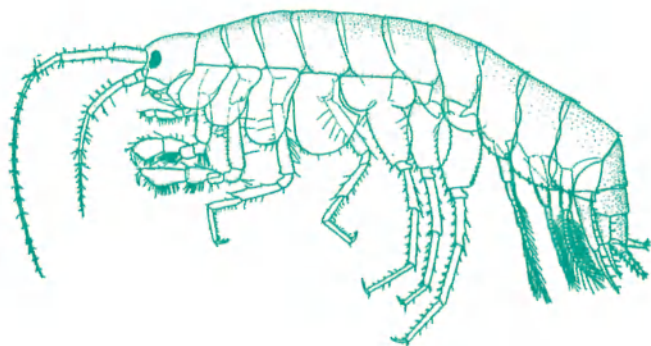


FRESHWATER BIOLOGICAL ASSOCIATION

THE COLONIZATION OF
WINDERMERE BY
CRANGONYX PSEUDOGRACILIS
1961 to 1964

E. M. Garland



OCCASIONAL PUBLICATION No. 12

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BY

CRANGONYX PSEUDOGRACILIS

(CRUSTACEA, AMPHIPODA)

1961 to 1964

by E.M. Garland

Freshwater Biological Association

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SUMMARY

The amphipod, *Crangonyx pseudogracilis*, was first seen in the South Basin of Windermere in 1960.

The colonization of the lake from South to North is described (1961 to 1964).

The relationship with *Asellus* and *Gammarus* is mentioned.

Possible reasons for its successful colonization are discussed as are the methods by which it may have been transported to the lake.

Geographical features of the lake are shown in Fig. 1.

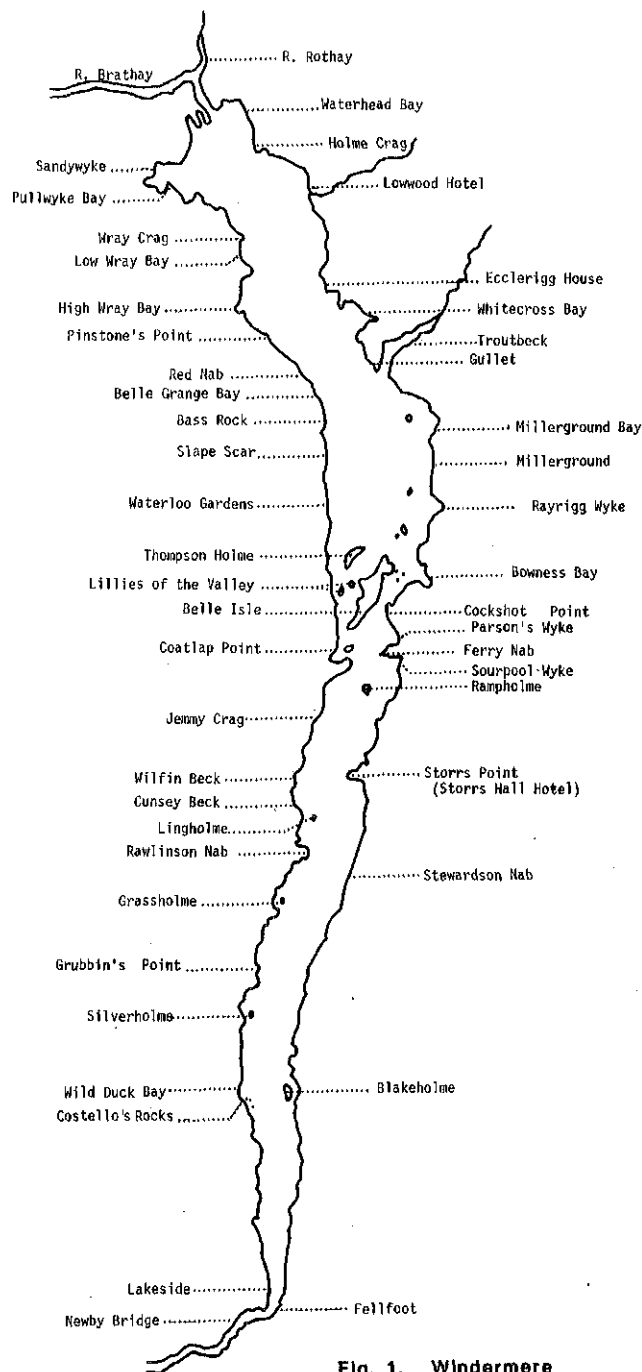


Fig. 1. Windermere

INTRODUCTION

In 1960, *Crangonyx pseudogracilis* (Bousfield), a North American species first reported in Britain in 1936 (Crawford 1937), was found in Windermere by the Freshwater Biological Association's Easter Class, and I was asked to survey the lake in order to record its distribution.

During the next four years (1961 to 1964) the spread of this amphipod was followed in detail until it had colonized the whole lake. The results are presented here.

MATERIALS AND METHODS

Collections were made by means of an FBA pond net used from a launch and also from the shore. The launch samples were taken from a depth of c. 1 to 1.5 metres (c. 3 - 5 feet); the shore samples from the shoreline to c. 1 metre.

The number of sweeps with the net varied. One only was taken if many *Crangonyx* appeared in the first sweep; several, if one *Crangonyx* appeared; and up to eight, in different directions, if no *Crangonyx* appeared.

Only presence and absence were recorded. Quantitative sampling was not attempted.

The results were mapped and notes made on the habitat. The presence or absence of *Gammarus pulex* (the only other amphipod present in Windermere) and of the isopod *Asellus* was recorded.

Unfortunately, no distinction was made between *Asellus aquaticus* and *A. meridianus* at the time.

RESULTS

First Survey - 24th April to 1st May, 1961.

Fifty-six samples were taken from Windermere and one from the Cunsey Beck. *Crangonyx* was present at 31 sampling points (see Fig. 2.).

It was absent throughout much of the North Basin, but present at most stations in the South Basin, a notable exception being the series of stations on both sides of the Cunsey Beck and the one in the beck itself.

Prolific samples were obtained from stations such as Fellfoot, Grassholme, just south of Rawlinson Nab and Sourpool Wyke, which were regions of *Phragmites*, submerged weed (usually *Myriophyllum*), silt and small stones.

Quiet backwaters were evidently preferred and *Crangonyx* was not found in turbulent waters. Only sparse samples were obtained off the Sewage Farm and from Stewardson Nab (where a particularly slimy green alga interfered with the movements of *Gammarus* and *Crangonyx* in the net). Likewise few individuals were found off Jemmy Crag and the side of the Wilfin Beck, which were stony areas.

Crangonyx was not found in areas of clean gravel with no rooted plants, nor among large stones.

When large numbers of *Crangonyx* were found, *Gammarus* was scarce, and vice versa; when large numbers of *Asellus* were present, *Crangonyx* was usually absent.

Asellus, *Crangonyx* and *Gammarus* were transported to Cambridge from Windermere in screwtopped jars. On arrival, all the *Crangonyx* were alive, some deaths had occurred among *Asellus*, but all the specimens of *Gammarus* had died.

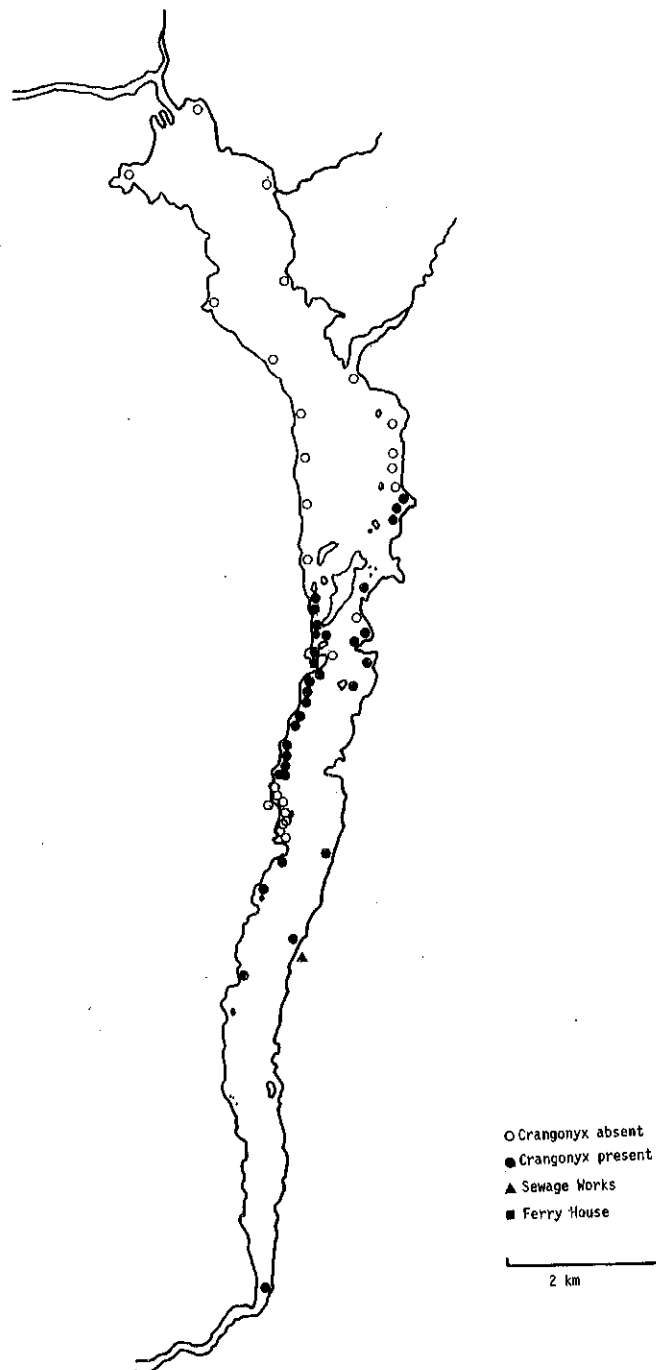


Fig. 2. Windermere: distribution of *Crangonyx*, 24. 4. 61

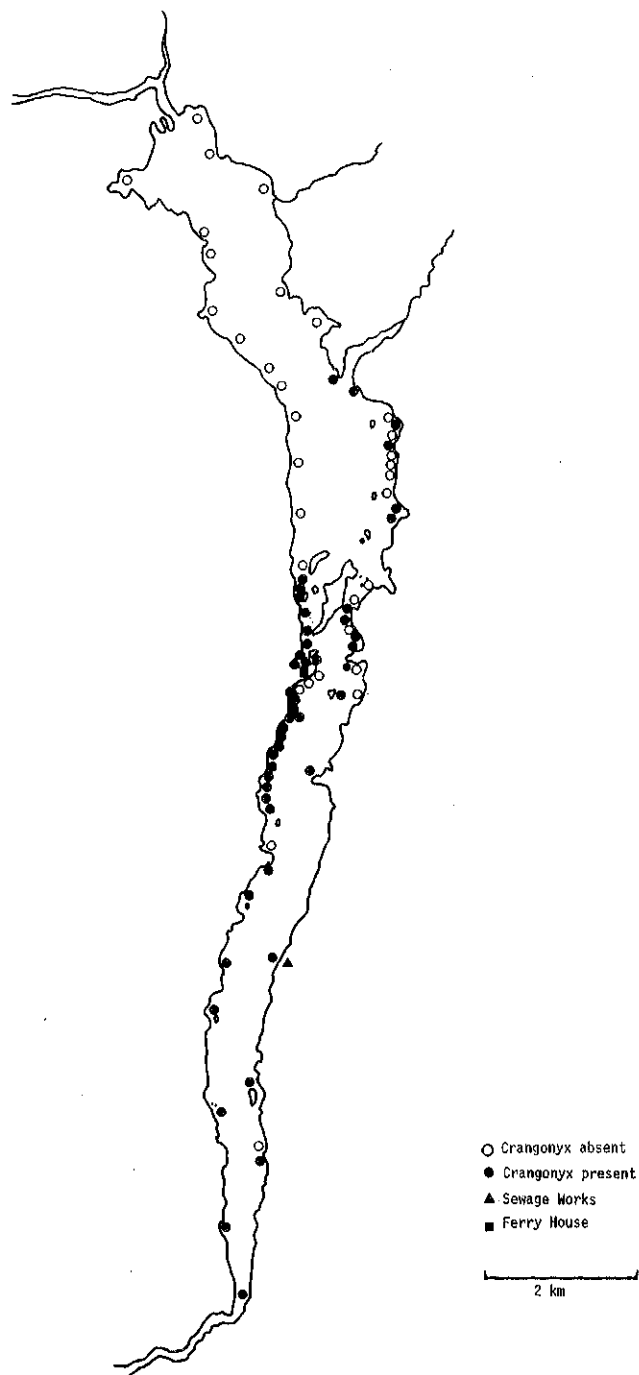


Fig. 3. Windermere: distribution of *Crangonyx*, 13. 8. 62

Second survey - 9th to 16th June, 1962.

In 1962, an attempt was made to resample at the previous stations but a rough lake prevented this at Stewardson Nab. Four other stations could only be sampled from the shore.

In all, 79 stations were sampled (Fig. 3). *Crangonyx* was present at 47 of them. It was still widespread in the South Basin and was now found adjacent to the mouth of the Cunsey Beck, but not in the beck itself.

An extension of range was also detected, particularly on the eastern shore, but much of this basin remained uncolonized.

Third Survey - 4th and 5th June, 1963.

All the 1961/1962 stations were revisited by launch and many others were sampled on foot. In all 62 samples were obtained. *Crangonyx* was present in 53 of them.

As Fig. 4 shows, further colonization of the North Basin had taken place, but it is significant that only a few individuals were found at some of the stations on the west shore; some suitable sites were either still uncolonized or had populations so sparse that no individuals were taken.

On June 3rd 74 sites around the entire shore of Esthwaite Water were sampled. No *Crangonyx* were found, nor were they found in Priest Pot or in Cunsey Beck near the bridge.

Fourth Survey - 11th September 1964.

Rough weather limited sampling to 32 stations and *Crangonyx* was present in all of them. As Fig. 5 shows the entire North Basin had been colonized, thus completing the colonization of the whole lake.

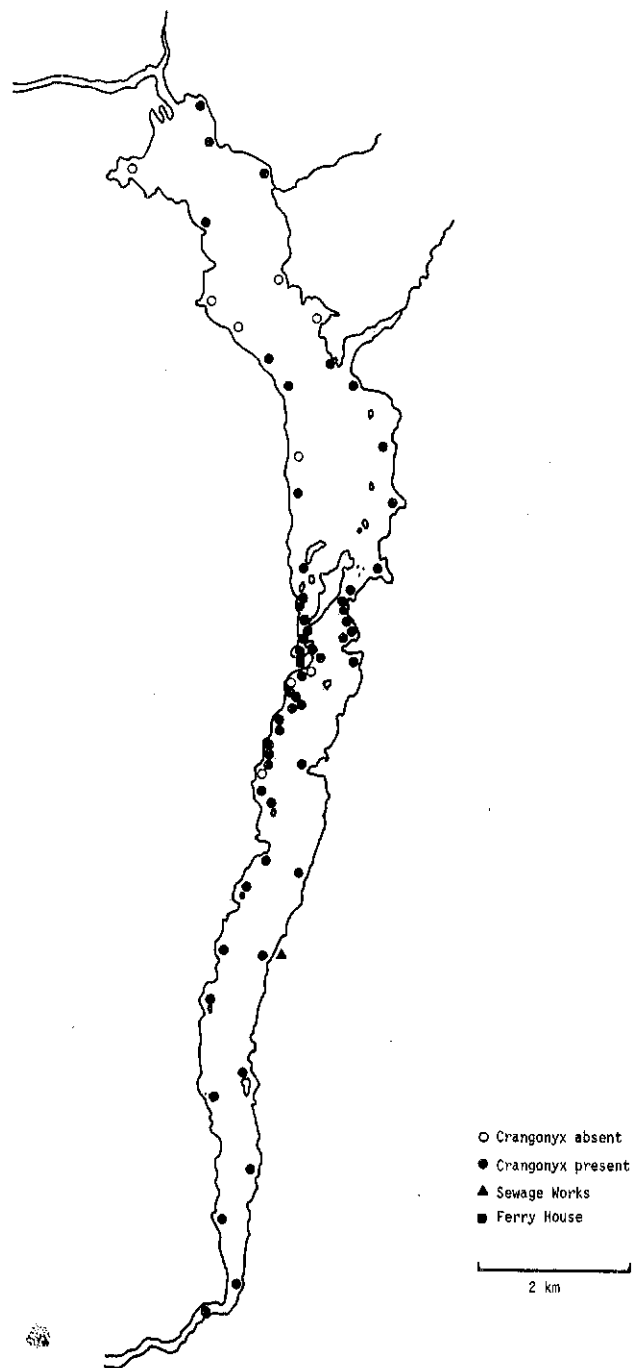


Fig. 4. Windermere: distribution of Crangonyx, 4. 8. 63

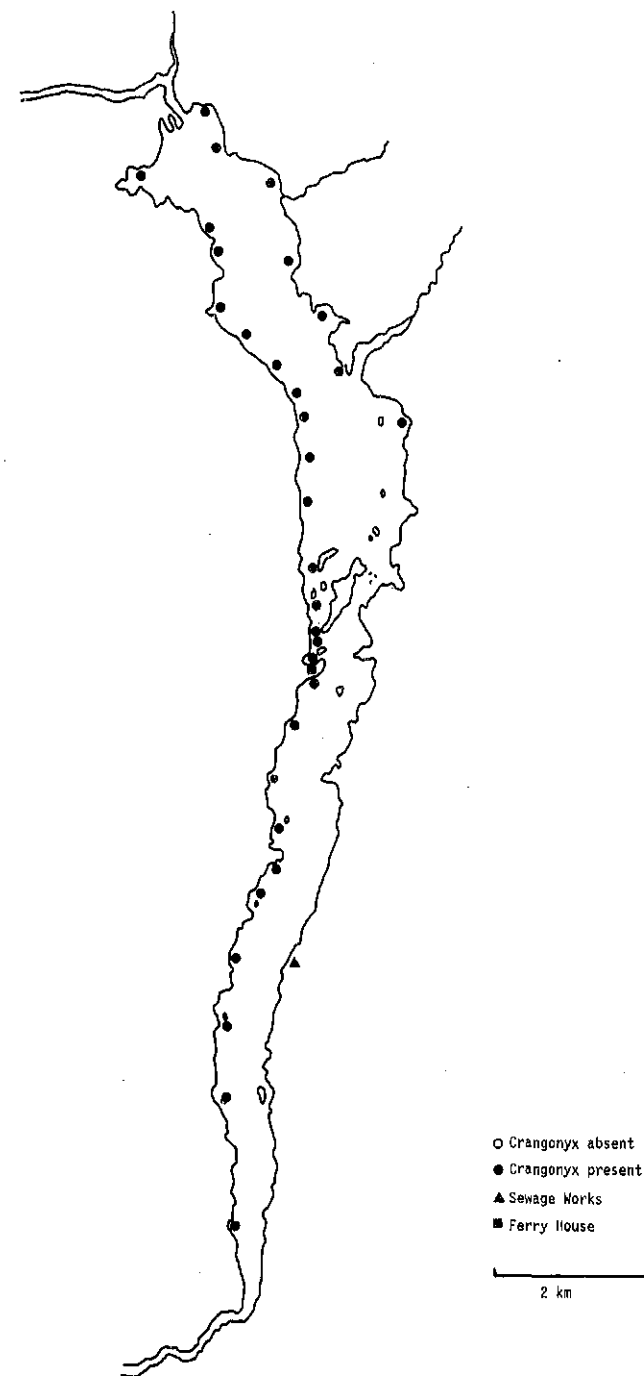


Fig. 5. Windermere: distribution of Crangonyx, 11. 9. 64

CONCLUSIONS

In just over 4 years, *Crangonyx*, which was established in the South Basin of Windermere in 1961, spread to occupy a variety of littoral habitats throughout the entire lake.

Regions of quiet water, with *Phragmites*, submerged vegetation or silt are evidently preferred, but stony or gravelly areas can be tolerated, and what appears to be the colonization of such an area was observed, perhaps after more favourable sites in the vicinity had been occupied.

Crangonyx appears to tolerate lower concentrations of oxygen than either *Gammarus* or *Asellus*.

How *Crangonyx* reached Windermere is not known. Various speculations about the transport of invertebrates have been made e.g. by Moon 1957, but meaningful factual information is very scarce. The hardiness of *Crangonyx* (Moon 1968) and its ability to survive for a short time out of the water may have assisted its spread.

ACKNOWLEDGEMENTS

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