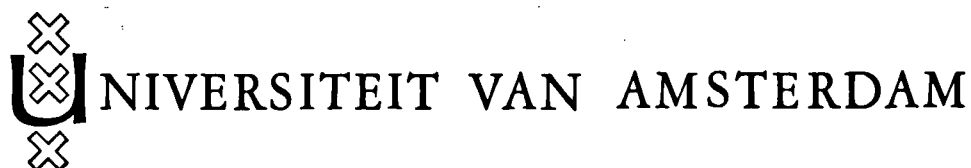


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RANGE EXTENSION IN THE PERIOD 1968 - 1970 OF THE ALIEN AMPHIPOD, *GAMMARUS TIGRINUS* SEXTON, 1939, IN THE NETHERLANDS

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ABSTRACT

Gammarus tigrinus was introduced in the Netherlands around 1964. Previous papers recorded the spreading of this amphipod in the successive years. In the period 1968 - 1970, it has invaded new regions in the provinces of Friesland, Groningen, Overijssel, Gelderland, Noord-Holland and Zuid-Holland, as well as in the Noordoostpolder and Oostelijk Flevoland. The maximum progress made since 1967 is about 36 kilometers. It is recorded for the first time south of the river Rhine.

In three previous papers (Nijssen & Stock, 1966; Pinkster & Stock, 1967; Dennert, Dennert & Stock, 1968) the spreading of the alien amphipod, *Gammarus tigrinus* Sexton, 1939, in the northern part of the Netherlands has been recorded. The progress of the species, explosive in 1965, slowed gradually down in 1966 and 1967, and a new survey of the range of the amphipod was not undertaken until late 1969 - early 1970.

While the main progress in 1967 was made in southwestern direction, practically no new territory was invaded in that direction in 1969, with one very remarkable exception: the Brielsche Meer, in which the species developed explosively. Since this lake attracts many yachtsmen, it is not unlikely that *G. tigrinus* was introduced artificially into the lake, which would explain its absence in the central part of Zuid-Holland. An important range extension was now realized in northeastern direction, thus in an area where almost no gain was made in 1967. In Overijssel, and in the Noordoostpolder, where *G. tigrinus* was still absent in 1967, the species appeared now for the first time.

The fact that the species showed up in the Brielsche Meer is of some importance, because no more physical barriers (such as the highly polluted lower ranges of the Rhine) seem to be present now preventing its further spread through the province of Zeeland, and into Belgium and northern France.

The 62 records of *G. tigrinus*, which constitute an extension of the previously known range, are recorded in table I and in fig. 1. In addition, just outside the area occupied by *G. tigrinus*, several checks have been made, yielding either one of the common local species (*G. pulex*, *G. duebeni*, or *G. zaddachi*), or no gammarids at all. Such checks were made in Friesland (45 samples), Groningen (1 sample), Overijssel (20 samples), IJsselmeerpolders (9 samples), Gel-

derland (29 samples), Utrecht (8 samples), Noord-Holland (43 samples), Zuid-Holland (62 samples), Noord-Brabant (1 sample), and Zeeland (10 samples). This rather dense sampling grid makes the range limits of *G. tigrinus*, as recorded in fig. 1, pretty reliable.

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Table I

New records, extending the known range, of *Gammarus tigrinus* in the Netherlands (1968 - 70)

<u>Locality</u>	<u>Municipality</u>	<u>Date</u> (day, month, year)	<u>Chlorinity</u> (mg/l)
Province of Friesland			
Moddergat near Wier	Menaldumadeel	4 - 11 - '69	287
Van Harinxmakanaal, Dronrijp	Menaldumadeel	4 - 11 - '69	328
Zijlsterak, Ritzumazijl	Menaldumadeel	4 - 11 - '69	555
Van Harinxmakanaal, Ritzumazijl	Menaldumadeel	4 - 11 - '69	525
Zwettervaart along Boxumerdijk	Leeuwarderadeel	4 - 11 - '69	182
Nauwe Greuns, W. of Hempens	Leeuwarderadeel	4 - 11 - '69	284
Kulkhornstervaart, near bridge in highroad E 10.	Tietjerksteradeel	5 - 11 - '69	141
Kolonelsdiep, Kootstertille	Achtkarspelen	5 - 11 - '69	134
Smalle Ee, Smalle Ee	Smallingerland	5 - 11 - '69	92
Haskerwijd, S. of Oudehaske	Haskerland	6 - 11 - '69	59
Engelenvaart, Rottum	Haskerland	6 - 11 - '69	49
Jonkersvaart, S.W. of Oldetrijne	Weststellingwerf	6 - 11 - '69	54
Linde, S. of Munnikeburen	Weststellingwerf	20 - 11 - '69	43
Stroobossertrekvaart, S. of Westergeest	Kollumerland en Nieuwkruisland	18 - 11 - '69	231
Nieuwe Vaart, W. of Zwaagwesteinde	Achtkarspelen	18 - 11 - '69	111
Stroobossertrekvaart, Gerkesklooster	Achtkarspelen	18 - 11 - '69	116
Prinses Margrietkanaal, Gerkesklooster	Achtkarspelen	18 - 11 - '69	113
Province of Groningen			
Hoendiep, Gaarkeuken	Zuidhorn	18 - 11 - '69	143
Van Starckenborghkanaal, Aduard	Aduard	18 - 11 - '69	70
Province of Overijssel			
Vollenhoverkanaal, Vollenhove	Vollenhove	6 - 11 - '69	57
Kadoelmeer, W. of Barsbeek	Vollenhove	6 - 11 - '69	107
Nieuwe Kanaal, Slijkenburg	Kuinre	20 - 11 - '69	292
Affluent of Vollenhoverkanaal, Blokzijl	Blokzijl	20 - 11 - '69	56
Roomslot, Baarlo	Blokzijl	20 - 11 - '69	102
Beulaker Wijde, W. of Westerbuurt	Wanneperveen	20 - 11 - '69	42
Noordoostpolder			
Zwolsche Vaart, Markenese	Noordoostpolder	20 - 11 - '69	636
Oostelijk Flevoland			
Zuidwestervaart, S.W. of Biddinghuizen	Oostelijk Flevoland	4 - 12 - '69	535
Connection Zuidwestervaart and Hoofdvaart II	Oostelijk Flevoland	4 - 12 - '69	1141
Hoofdvaart II, 1 km S. of Lelystad	Oostelijk Flevoland	4 - 12 - '69	1202
Branch canal near fish basins, N.E. of Lelystad	Oostelijk Flevoland	4 - 12 - '69	646

Table I, continued

Branch canal of Hoofdvaart II, 1 km N.E. of Swifterbant	Oostelijk Flevoland	4 - 12 - '69	828
Province of Noord-Holland			
Naardertrekvaart, Naarden	Naarden	22 - 11 - '69	188
Amstel, Nes aan de Amstel	Ouder - Amstel	24 - 11 - '69	919
Mooie Nel, S. of Spaarndam	Haarlemmerliede en Spaarnwoude	17 - 7 - '69	-
Nieuwe Kerkertocht, S.W. of Hoofddorp	Haarlemmermeer	17 - 3 - '70	542
Watering, Zaandam	Zaandam	15 - 3 - '70	407
Kollesloot, Oostzaan	Oostzaan	15 - 3 - '70	268
Twiske, Oostzaan	Oostzaan	15 - 3 - '70	250
Haal, Oostzaan	Oostzaan	15 - 3 - '70	215
Nogsloot, Landsmeer	Landsmeer	15 - 3 - '70	-
Banscheiding, N. of Den IJp	IJpendam	15 - 3 - '70	429
Sluissloot, Ringweg Enge Wormer	Wormer	15 - 3 - '70	133
Binnendelft near watertower	Assendelft	15 - 3 - '70	218
De Reef, along dike to Westzaan	Westzaan	15 - 3 - '70	321
Laandervaart, Limmen	Limmen	18 - 3 - '70	95
Hondsbossche Vaart, Leihoek	Zijpe	18 - 3 - '70	1157
Burgervaart, Pettener Kluit	Zijpe	18 - 3 - '70	355
Hondsbossche Vaart, Oud Schoorlse Zeedijk	Zijpe	18 - 3 - '70	1509
Callantsoogervaart, N. of Groote Keeten	Callantsoog	22 - 7 - '70	611
Doggersvaart, S. of Nieuw Den Helder	Den Helder	22 - 7 - '70	1137
Ditch along Hoorndijk, S. of Den Oever	Wieringen	22 - 7 - '70	853
Ditch along Normerdijk	Wieringen	22 - 7 - '70	1231
Ditch along Stroeërdijk	Wieringen	22 - 7 - '70	653
Province of Zuid-Holland			
Nieuwkoopse Plassen, E. of Noorden	Nieuwkoop	24 - 11 - '69	656
Braassemermeer, Oude Wetering, near ferry	Leimuiden	24 - 11 - '69	206
Braassemermeer, Roelofarendsveen	Roelofarendsveen	24 - 11 - '69	205
Connection Kagerplas - Wijde Aa, near Rijpwetering	Warmond	24 - 11 - '69	373
Vliet, Leiden	Leiden	24 - 11 - '69	232
Brielsche Meer, shore of Nieuwe Ondernemings Polder	Brielle	20 - 8 - '70	380
Harbour of Zwartewaal	Zwartewaal	20 - 8 - '70	270
Province of Gelderland			
Noordermerkkanaal, Bolsmerksluis	Doornspijk	6 - 3 - '70	40
Gelderse Gracht, E. of Kampernieuwstad	Doornspijk	6 - 3 - '70	35
Harbour of Nijkerk, near bascule bridge	Nijkerk	6 - 3 - '70	257
Arlese Steeg near pumping - station	Nijkerk	6 - 3 - '70	162

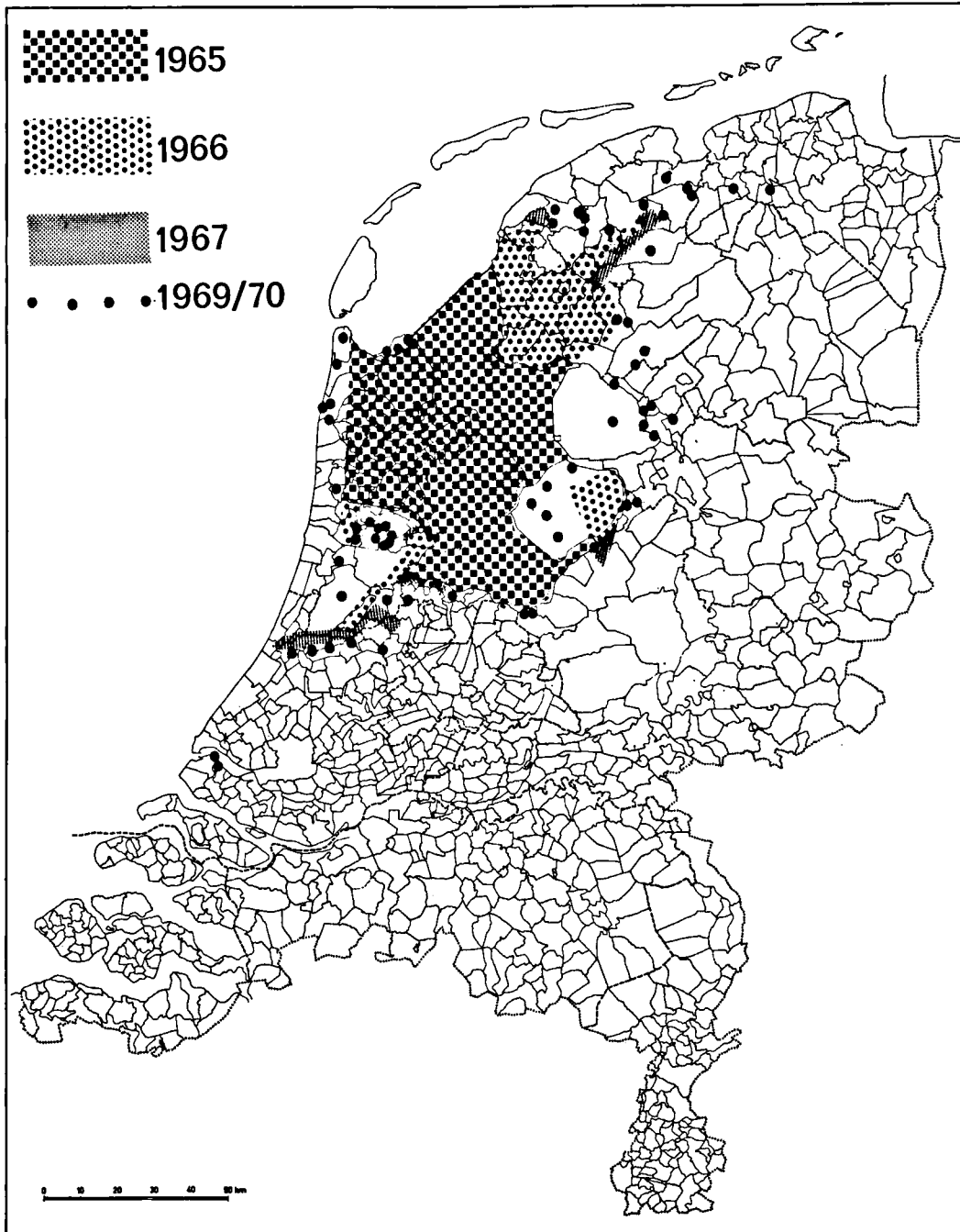


Fig. 1. Previous distribution, and new records, of *Gammarus tigrinus* in The Netherlands.