

The non-marine Cladocera of Belgium

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Summary

The historic development of knowledge on the Cladocera of Belgium is outlined. At present, 74 species are on record, and a further 15% increase may reasonably be anticipated. Centers of research have been, in chronological order, the State University of Gent, the Museum (now Institute) of Natural Sciences in Brussels, and again the State University of Gent. As a result of the geographical situation of the latter, the south of the country has been least explored, and this is where most additions (in temporary and interstitial waters) are to be expected.

Key-words : Cladocera, faunistics, Belgium.

Samenvatting

De historische ontwikkeling van de kennis over de Cladocera van België wordt geschetst. De huidige soortenrijkdom bedraagt 74 species en er kan nog ruim 15 % groei verwacht worden. De centra van onderzoek waren, in chronologische volgorde, de Rijksuniversiteit Gent, het Museum (later Instituut) voor Natuurwetenschappen te Brussel, en opnieuw de Rijksuniversiteit Gent. Hieruit volgt dat het zuiden des Lands het minst bestudeerd werd. Daar zijn de meeste aanwinsten (vooreerst in tijdelijke en interstitiele waters) te verwachten.

Trefwoorden : Cladocera, faunistiek, België.

1. Introduction

The Cladocera are a freshwater group of Crustacea (three species occur in the North Sea Channel, but only *Podon leuckarti* penetrates into the estuaries of the Belgian coast). Some are predacious (*Leptodora kindtii*, *Polyphemus pediculus*), but the vast majority are particulate filter feeders. The Bosminidae and a majority among the Daphniidae are limnetic, while almost all Chydoridae are restricted to the weedy littoral of lakes and ponds, and to the benthos. The Macrothricidae, finally, are predominantly benthic, although some may be littoral. Expected occurrences of Cladocera in "special" biotopes, will be mentioned at the end of this article.

The aim of the present paper is to update our knowledge of the Cladoceran species hitherto recorded from the Belgian territory, to identify gaps in the information available, and to suggest areas for further studies.

The history of research on the Cladocera of Belgium begins with Felix PLATEAU (1868, 1870), a teacher of biology at a highschool in Bruges, who later became a

professor of zoology at the University of Gent. He recorded 15 species in 12 genera (Table 1). His list was later re-used by Auguste LAMEERE (1895) in his "Faune de Belgique". By 1924, however, not less than 64 species had become known from the Netherlands (DE LINT, 1924), indicating the need for a thorough cladocerological exploration of the Belgian territory. Paul VAN OYE, then a young professor of zoology at the University of Gent, attracted a student in medicine, Maurits LUYTEN, for this purpose. After five years of study, this resulted in a key (VAN OYE & LUYTEN, 1934), a short note (LUYTEN, 1932) and a monograph (LUYTEN, 1934). The latter publication, although called "ecological", was almost purely biogeographical in nature. Yet, the number of species known jumped to 56 (or 57, if the Moinids cited by PLATEAU and LAMEERE are accepted as different species - see further; see also Table 1) and LUYTEN's work undoubtedly remains the backbone of our knowledge of the Cladocera of Belgium to date. Some scattered publications in the next few decades (E. VAN OYE, 1937; DAMAS, 1939; CRÉ, 1940; EVENS, 1954) added chorological data, but no further species.

A series of papers of considerable importance, which may be singled out as a first "post-war" phase of research, were published by Eugène LELOUP and co-workers from the Institute of Natural Sciences, Brussels (LELOUP, 1946, 1956; LELOUP & JACQUEMART, 1963; LELOUP & KONIETZKO, 1953; LELOUP & VAN MEEL, 1958; LELOUP, VAN MEEL & JACQUEMART, 1954; JACQUEMART & LELOUP, 1956, 1958a, 1958b; LEFEVERE, LELOUP & VAN MEEL, 1956). In spite of this impressive suite of articles, only a single species was added to the Belgian fauna, viz. the rare *Chydorus gibbus*. In fact, this record, from the mesohaline port of Ostend (Det. S. JACQUEMART), is out of place, and in need of confirmation.

A second postwar phase is again linked with research conducted by students of the University of Gent. SCHEPENS (1963) added two chydorids from the area of Genk, based upon a study of CORIJN (1964) for the J. KETS award of the Antwerp ZOO (see also CORIJN, 1969). Further additions resulted from my own work,

partly on the Scapholeberinae (DUMONT, 1966, 1971; DUMONT & PENSAERT, 1983) (including the description of *S. rammeri* n.sp. with Lake Donk, E. Flanders, as the type locality) and on a series of oligohaline oxbow-lakes ("creeks") in the Flandrian-Dutch border zone (DUMONT & GYSELS, 1971). The fauna of these brackish-water creeks illustrated the rapid decrease in Chydorid diversity with salinity, conferring to the Daphnids a position of dominance in such biotopes. The 1970ies were marked by two further events: the discovery, in Europe, of two presumed North-American *Daphnia* species (DUMONT, 1974; COUSSEMENT, DE HENAU & DUMONT, 1976) and a considerable renewed interest in the taxonomy of the Cladocera (FREY, 1987) worldwide. As a partial result, the "old" taxon *D. pulex* is now widely considered to consist of at least three good species, all of which were found to occur in Belgium. Finally, numerous students in my group of limnologists at the University of Gent identified collections and wrote dissertations in which Cladocera were recorded, several of which were additions to the Belgian fauna.

The resulting checklist (Table 1), as updated to end of November 1988, is presented hereunder. It amounts to 74 species (fig. 1) (one of which is doubtful, as indicated earlier). It represents a considerable expansion if compared to LUYTEN's list. However, in the Netherlands, 85 species are now on record (two of which are doubtful) (NOTENBOOM-RAM, 1981). Thirteen species found in The Netherlands have not been recorded from Belgium, while only one Belgian species (*Alona intermedia*) has not yet been found in the Netherlands. This clearly illustrates the need for a continued faunistic effort in Belgium, where especially the Southern provinces still lag behind significantly.

2. Check-list (Table 1)

Species marked with an asterisk are first reports in the published literature (i.e. they are species only mentioned in dissertations, or not previously mentioned at all). Species marked with a double asterisk are commented upon in section 3.1.

TABLE 1

SPECIES NAME	FIRST AND/OR KEY REFERENCE
Family Sididae.	
1. <i>Sida crystallina</i> (O.F. MULLER, 1976)	LUYTEN, 1934
2. <i>Diaphanosoma brachyurum</i> (LIEVIN, 1848)**	LUYTEN, 1934
Family Daphniidae	
3. <i>Daphnia magna</i> STRAUS, 1820**	PLATEAU, 1870
4. <i>Daphnia obtusa</i> KURZ, 1874**, *	<i>This paper</i>
5. <i>Daphnia parvula</i> FORDYCE, 1901**	COUSSEMENT et al., 1976
6. <i>Daphnia curvirostris</i> EYLMAN, 1887**, *	<i>This paper</i>
7. <i>Daphnia pulex</i> LEYDIG, 1860**	PLATEAU, 1870
8. <i>Daphnia ambigua</i> SCOURFIELD, 1946**	DUMONT, 1974
9. <i>Daphnia longispina</i> O.F. MULLER, 1785**	PLATEAU, 1870
10. <i>Daphnia hyalina</i> LEYDIG, 1860**	DUMONT & GYSELS, 1971
11. <i>Daphnia cucullata</i> SARS, 1862*	LUYTEN, 1934
12. <i>Ceriodaphnia reticulata</i> (JURINE, 1820)	LUYTEN, 1934
13. <i>Ceriodaphnia megops</i> SARS, 1862	LUYTEN, 1934
14. <i>Ceriodaphnia pulchella</i> SARS, 1862	LUYTEN, 1934
15. <i>Ceriodaphnia quadrangula</i> (O.F. MULLER, 1785)	PLATEAU, 1870
16. <i>Ceriodaphnia dubia</i> RICHARD, 1894	DUMONT & GYSELS, 1971
17. <i>Ceriodaphnia setosa</i> MATILE, 1890*	LUYTEN, 1934
18. <i>Ceriodaphnia laticaudata</i> P.E. MULLER, 1867	LUYTEN, 1934
19. <i>Ceriodaphnia rotunda</i> SARS, 1862	DUMONT & GYSELS, 1971
20. <i>Scapholeberis mucronata</i> (O.F. MULLER, 1785)	PLATEAU, 1870
21. <i>Scapholeberis rammeri</i> DUMONT & PENSAERT, 1983	
22. <i>Megafenestra aurita</i> (S. FISCHER, 1849)	DUMONT, 1971
23. <i>Simocephalus vetulus</i> (O.F. MULLER, 1776)	DUMONT, 1966
24. <i>Simocephalus expinosus</i> (KOCH, 1841)**	PLATEAU, 1870
25. <i>Moina macrocopa</i> (STRAUS, 1820)**	LUYTEN, 1934
26. <i>Moina brachiata</i> (JURINE, 1820)**	PLATEAU, 1870
	LAMEERE, 1895

Family Bosminidae

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| 27. <i>Bosmina longirostris</i> (O.F. MULLER, 1785) | PLATEAU, 1870 |
| 28. <i>Bosmina longispina</i> LEYDIG, 1860*, ** | <i>This paper</i> |
| 29. <i>Bosmina coregoni</i> BAIRD, 1857 | LUYTEN, 1934 |

Family Macrothricidae

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| 30. <i>Iliocryptus sordidus</i> (LIEVIN, 1848) | LUYTEN, 1934 |
| 31. <i>Iliocryptus agilis</i> KURZ, 1878 | LUYTEN, 1934 |
| 32. <i>Iliocryptus acutifrons</i> SARS, 1862 | LUYTEN, 1934 |
| 33. <i>Lathonura rectirostris</i> (O.F. MULLER, 1785) | LUYTEN, 1934 |
| 34. <i>Macrothrix laticornis</i> (JURINE, 1820)** | LUYTEN, 1934 |
| 35. <i>Macrothrix rosea</i> (JURINE, 1820) | LUYTEN, 1934 |
| 36. <i>Macrothrix hirsuticornis</i> NORMAN & BRADY, 1867*, ** | <i>This paper</i> |
| 37. <i>Drepanothrix dentata</i> (EUREN, 1861) | LUYTEN, 1934 |
| 38. <i>Acantholeberis curvirostris</i> (O.F. MULLER, 1853) | LUYTEN, 1934 |

Family Chydoridae

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| 39. <i>Eurycercus lamellatus</i> (O.F. MULLER, 1785)** | PLATEAU, 1868 |
| 40. <i>Camptocercus rectirostris</i> SCHOEDLER, 1862 | LUYTEN, 1934 |
| 41. <i>Camptocercus lilljeborgi</i> SCHOEDLER, 1862 | LUYTEN, 1934 |
| 42. <i>Acroperus harpae</i> (BAIRD, 1835) | PLATEAU, 1868 |
| 43. <i>Acroperus elongatus</i> (SARS, 1862) | LUYTEN, 1934 |
| 44. <i>Oxyurella tenuicaudis</i> (SARS, 1862) | LUYTEN, 1934 |
| 45. <i>Alona rectangula</i> SARS, 1862 | LUYTEN, 1934 |
| 46. <i>Alona guttata</i> SARS, 1862 | LUYTEN, 1934 |
| 47. <i>Alona costata</i> SARS, 1862 | LUYTEN, 1934 |
| 48. <i>Alona quadrangularis</i> (O.F. MULLER, 1785) | PLATEAU, 1868 |
| 49. <i>Alona affinis</i> (LEYDIG, 1860) | SCHEPENS, 1963 ; CORIJN, 1969 |
| 50. <i>Alona intermedia</i> SARS, 1862* | <i>This paper</i> |
| 51. <i>Rhynchotalona falcata</i> (SARS, 1862) | LUYTEN, 1934 |
| 52. <i>Leydigia quadrangularis</i> (LEYDIG, 1860) | LUYTEN, 1934 |
| 53. <i>Leydigia acanthocercoides</i> (FISHER, 1854) | LUYTEN, 1934 |
| 54. <i>Disparalona rostrata</i> (KOCH, 1841) | LUYTEN, 1934 |
| 55. <i>Graptoleberis testudinaria</i> (FISCHER, 1848) | LUYTEN, 1934 |
| 56. <i>Monospilus dispar</i> SARS, 1862 | LUYTEN, 1934 |
| 57. <i>Alonella excisa</i> (FISCHER, 1854) | LUYTEN, 1934 |
| 58. <i>Alonella exigua</i> (LILLJEBORG, 1853) | LUYTEN, 1934 |
| 59. <i>Alonella nana</i> (BAIRD, 1843) | LUYTEN, 1934 |
| 60. <i>Pleuroxus truncatus</i> (O.F. MULLER, 1785) | PLATEAU, 1868 |
| 61. <i>Pleuroxys denticulatus</i> BIRGE, 1879 | SCHEPENS, 1963 ; CORIJN, 1969 |
| 62. <i>Pleuroxus laevis</i> SARS, 1862 | LUYTEN, 1934 |
| 63. <i>Pleuroxus trigonellus</i> (O.F. MULLER, 1785) | PLATEAU, 1868 |
| 64. <i>Pleuroxus uncinatus</i> BAIRD, 1850) | LUYTEN, 1934 |
| 65. <i>Pleuroxus aduncus</i> (JURINE, 1820) | LUYTEN, 1934 |
| 66. <i>Pleuroxus piger</i> (SARS, 1862)*, ** | <i>This paper</i> |
| 67. <i>Chydorus gibbus</i> SARS, 1890** | LEFEVERE et al., 1956 |
| 68. <i>Chydorus ovalis</i> KURZ, 1874 | LUYTEN, 1934 |
| 69. <i>Chydorus latus</i> SARS, 1862 | LUYTEN, 1934 |
| 70. <i>Chydorus sphaericus</i> (O.F. MULLER, 1785) | PLATEAU, 1868 |
| 71. <i>Pseudochydorus globosus</i> (BAIRD, 1843) | LUYTEN, 1934 |
| 72. <i>Anchistropus emarginatus</i> SARS, 1862 | LUYTEN, 1934 |

Family Polyphemidae

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| 73. <i>Polyphemus pediculus</i> (LINNAEUS, 1761) | PLATEAU, 1870 |
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Family Leptodoridae

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| 74. <i>Leptodora kindtii</i> (Focke, 1844) | LUYTEN, 1934 |
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3. Discussion

3.1. Comments on selected species

It is quite uncertain whether only *Diaphanosoma brachyurum* occurs in Belgium. Recent revisions (KOROVCHINSKY, 1982; KORINEK, 1987) have shown that a minimum of five species occur in Europe, and Belgian populations should be re-examined in the light of this insight. *Daphnia magna*, a rarity in LUYTEN's days, has now become an abundant and widespread animal, especially in polluted waters. It thus occurs in high numbers in such rivers as the Sambre downstream of Charleroi and the Leie near Gent. One of the few populations of LUYTEN's days was living in an organically polluted park pond in a park in the city of Gent. DE MEESTER (1987) found this population still to be extant, and cultured specimens for experimental work on phototaxis. Of the *D. pulex* group, *D. obtusa* was found in fishponds at Mirwart in late summer 1969 by HRBACEK (pers. comm.), while *D. curvirostris* was found to co-occur with *D. pulex* s.s. in flooded alder tree stands in the valley of the River Dender ("Wellemeersen"). *D. cucullata*, common in lake Donk in the 1930ies, was replaced by a morph of *D. hyalina* (det. J. HRBACEK, 1971) in the late 1960ies. This morph is still present there (ROCHE, 1988), although the possibility that a fair fraction of the parthenogenetic females in summer are in fact hybrids (*D. longispina* & *D. hyalina*) is worth being explored. Such hybridisations are now known to be the rule rather than the exception in lakes where several pelagic *Daphnia* co-occur (WOLF, 1987; WOLF & MORT, 1986).

D. ambigua, first recorded from Lake Donk in the 1960ies (DUMONT, 1974), still persists in the area (ROCHE, 1988). *D. parvula* has also been recorded there (COUSSEMENT *et al.*, 1981) and also from a pond in the park of the Institute of Natural Sciences, Brussels and an inundated quarry in Luxembourg (June 1983). Since DUMONT & GYSELS (1971), *Ceriodaphnia dubia*, was also found in the canal of Berlare Broek near Lake Donk and in flooded meadows along the river Dender, while *C. rotunda* occurred in a farm-pool at Berlare, Lake Donk area, in July 1975.

In the genus *Scapholeberis* there occurred a gradual rarification of *S. mucronata* since the 1960ies, *S. rammeri* becoming more common and widespread in all non-acidic waters. In some pingoes of the Hautes Fagnes (Baraque Fraiture), populations of *S. mucronata* with a reduced mucro were found in June 1983, but no *S. microcephala*.

The genus *Simocephalus* is in need of revision. *S. expinosus*, repeatedly reported from many localities in Belgium, needs to be re-checked. *S. congener*, frequently cited as a synonym to *S. expinosus*, might in fact be a distinct species, and possibly both *S. congener* and *S. expinosus* occur in Western Europe.

Of the family Moinidae, two species are on record (*M. brachiata* and *M. macrocopa*). They are among the oldest species known in Belgium (PLATEAU, 1870; LAMEERE, 1895), but it is uncertain which of these species these authors really had before them. However, it can now be confirmed that both actually occur and are widespread in Belgium, with a neat preference for organically polluted waters.

Bosmina longispina, a first record, occurs in acidic waters, e.g. in some peat bogs at Kalmthout. *Macrothrix laticornis*, rare in LUYTEN's days, is now comparatively widespread, especially in newly-dug sand-pits along motorways. It preferentially occurs over sandy bottoms without vegetation. *M. hirsuticornis* has been recorded from the weedy littoral of the boatracing canal (Watersportbaan) in Gent (DE HENAU, 1980).

Alona intermedia, the only species recorded in Belgium and not in the Netherlands, was found in the river Sambre close to the French frontier (Solre-sur-Sambre, June 1973). It was also found upstreams of the industrial area of Maubeuge in France (WAEYAERT, 1973).

Pleuroxus piger, formerly assigned to the genus *Chydorus*, was reallocated to *Pleuroxus* (DUMONT, 1983) by analogy with *P. pigroides* (LILLJEBORG) (FREY, 1976). However, this situation still seems unsatisfactory; a new genus may be required to accommodate both species (beside morphological characteristics, the two frequently occur in subterranean waters). *P. piger* was found once (summer 1978) in the natural reserve "the Teut" in Limburg (leg. H. GYSELS, Det. I. VAN DE VELDE).

3.2. Gaps and suggestions for future research.

Geographically, large areas of the country remain inadequately explored. This is generally true of the southern provinces, and of the West, but in fact also of the campinian area, and of the border zone with The Netherlands in the Antwerp province. Only the area around Gent in Eastern Flanders may be considered to be explored in detail. As a result, more than 60 % of all Belgian species have been recorded from the sole area of the Lake Donk.

Among species to be looked for in the future, *Eurycerus glacialis* should be mentioned. This large species was recorded fairly close to the border in the Netherlands (FREY, 1965), and is to be expected, either as extant populations, or as subfossil remains in lake sediments, in the North of Belgium.

Another species to be expected is *Simocephalus serrulatus* (KOCH). It has been found in Germany and The Netherlands, in acidic waters, but it occurs in Southern Europe and Africa in alkaline waters as well. Also, some mediterranean species on record from The Netherlands (*Daphnia similis*, *Moina micrura*) should be present in Belgium. A promising area to be explored is the zone between the rivers Sambre-and-Meuse, and particularly the semi-permanent waters found there.

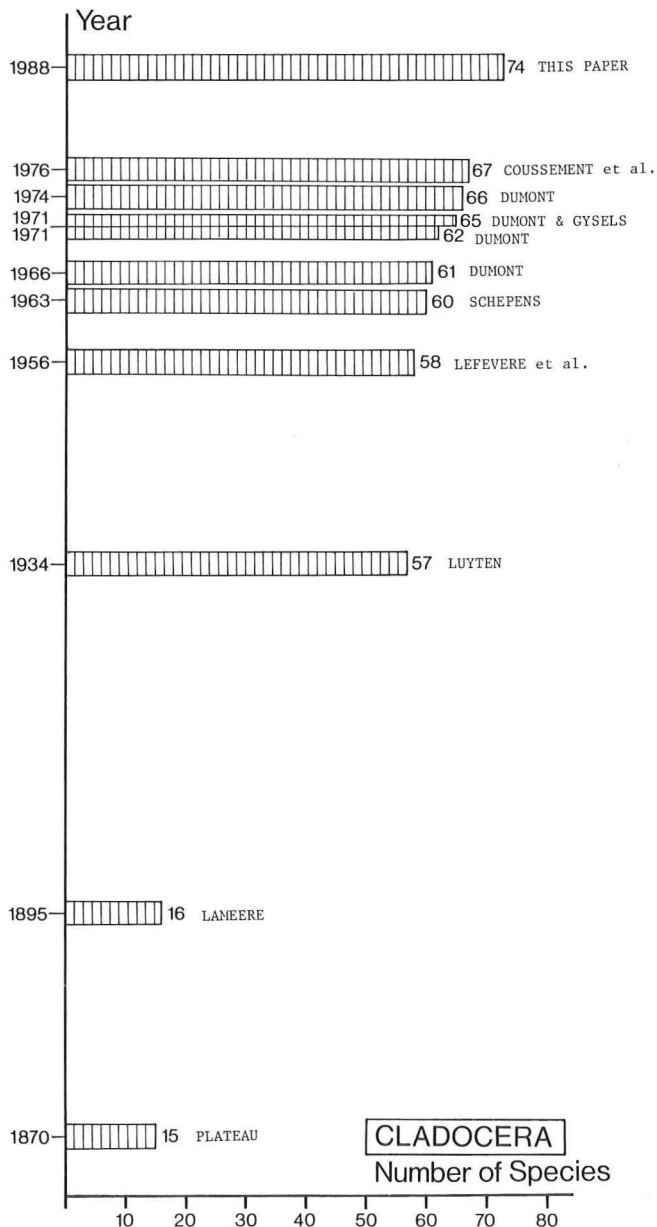


Fig. 1 : An overview of the historical development of the faunistic knowledge on the Cladocera of Belgium. With each bar, author(s) and total number of species on record at that point in time are indicated. The present adds six species to the list, recorded between 1976 and 1988.

Finally, two *Alona*-species (*A. protzi*, *A. rustica*) known from The Netherlands, should be looked for in Belgium in subterranean waters, more precisely river gravels. This type of environment has recently yielded rich Cladoceran faunas, and quite a few chydorids, formerly reputed to be extremely rare, now appear to be quite common in this type of habitat (DUMONT, 1987).

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