

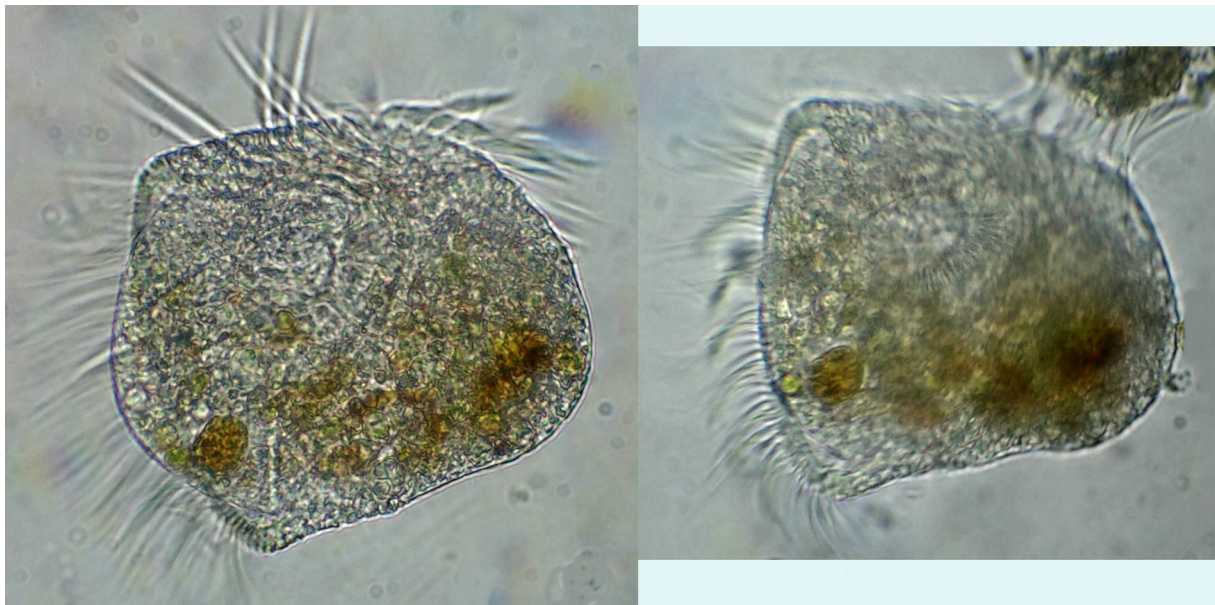
A rare protozoan : *Gastrocirrhus*
JM Cavanihac - France

One of the questions we ask ourselves when we encounter a rare organism is that of its identification. With its name it is then possible to obtain more complete information either in specialized books (which we often do not have!) or on the Net, nowadays. The method used here can be applied to other organisms: rotifers, cladocerans, etc.)

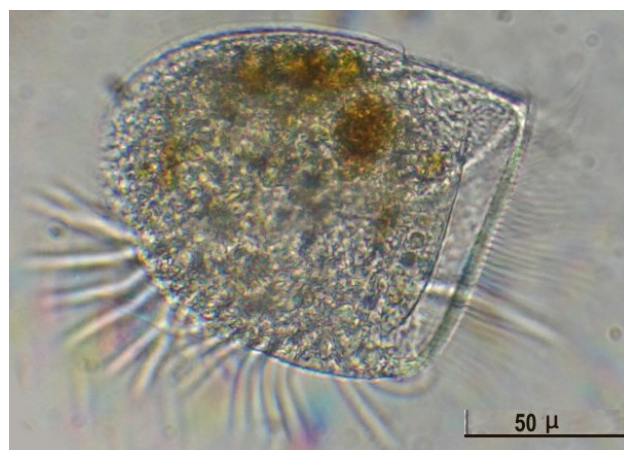
Ready for a “protozan’s cluedo” by collecting clues?...

It all starts with the collection of several specimens found on a rope soaking in seawater, by scraping deposits on it,

The first step is observation by trying to take as many images as possible according to various planes of focus. Here the specimens are alive, (without coverslip) which makes it possible to appreciate the movements, the behavior and to assign them to a phylum: here it is therefore a protozoan: ventral view here.



We immediately notice a wide opening lined with cilia (cytostome) with a kind of indentation (best highlighted in the photo on the right), cirri in the caudal part, displacements with a form of walking on the cirri. Dorsal view below:



The second step is the assignment to an order of the classification: the presence of cirri directs towards *Euplotes* (note that often the names are in Latin so look for a plural Euplotidae). If we have no idea at this stage, we can use a simple dichotomous key: for example this one:

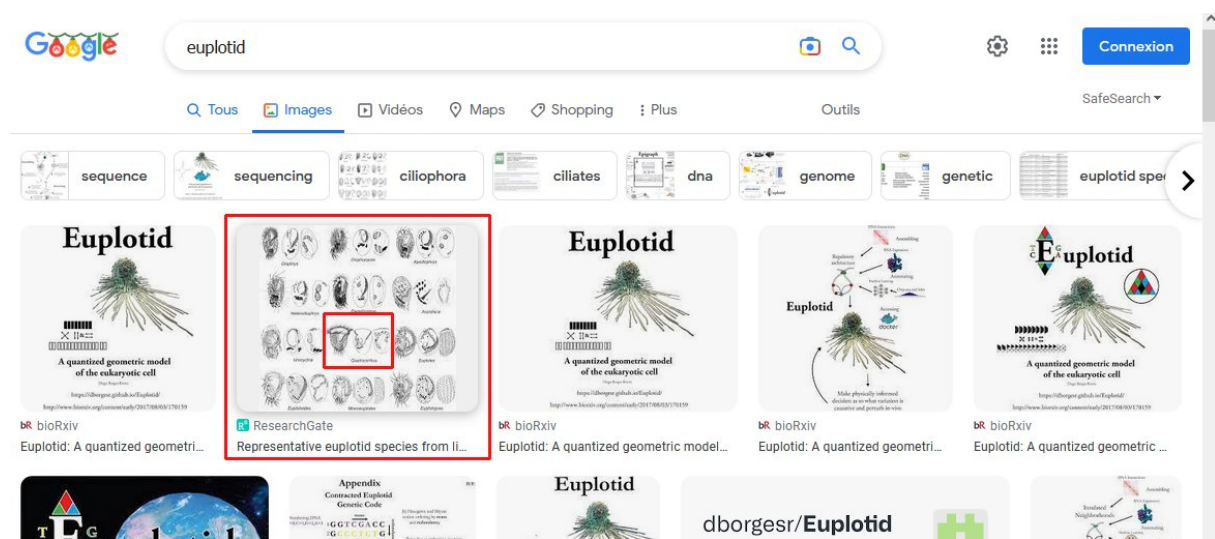
<http://searkscience.pbworks.com/w/file/etch/60206435/Key..>

Item 7 leads to 16 then 17 then 18: *Euplotes*

I am not familiar with the keys: some are too complex and call for definitions of specific structures: (example: Adoral Zone of Membranelles noted AZM: out of 3 words, 2 are difficult to identify for a non-specialist!)

Third step : We can then search on the Net using the word that will bring the most images: Euplotidae, or truncated: euplotid.

The search in image mode using Euplotid * (*=joker!) gives this: the 2nd occurrence shows an image whose drawing surrounded in red looks like the unknown: by clicking on the image we go to this link:



https://www.researchgate.net/figure/Representative-euplotid-species-from-live-material-and-after-protargol-impregnation_fig1_229162261

in the center of the board, the shape strongly evokes our unknown and therefore suggests Gastrocirrus! Family Gastrocirrhidae. The article itself does not give information on this specimen, but this table of Euplotidae is interesting.

We can therefore refine the search on this family: the WoRMS (World Register of Marine Species) database gives 5 genera in this family. An intuition, when I met the first specimen, was to tell me: it's a stomach on legs (in Latin gastrocirrus / or cirrogaster !) We could also have looked for the 4 other genera... and seen that the pictures do not match...

By doing the search first on this name, we find a more precise study:

<https://www.semanticscholar.org/paper/Redescription-of-two-known-species%2C-Gastrocirrus-Hu-Song/51f06f73e3cbbf6813667146d16acb45f6fcbf79>

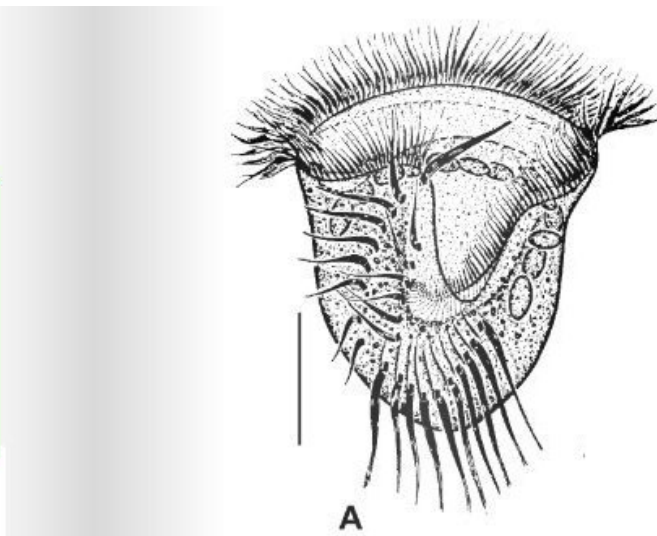
The article is not accessible free of charge, but the images and tables are: we will come back to the comparative tables of the characteristics of the species. The article – interesting – and in free reading is on this site: (obtained by searching for the full title of the monograph)

<https://www.yumpu.com/en/document/read/5111340/redescription-of-two-known-species-gastrocirrus-monilifer-ozaki->

See description en page 346 where the image below is taken from:

cirri, absence of marginal cirri, body shape, highly developed transverse cirri and the buccal apparatus (Lepsi 1928, Fauré-Fremiet 1954, Curds and Wu 1983, Dragesco and Dragesco-Kerneis 1986). Based on previous descriptions and the present data, we supply here an improved diagnosis for the genus *Gastrocirrhus*.

Diagnosis of the genus *Gastrocirrhus*: marine planktonic Gastrocirrhidae, cells generally cup- or bell-shaped with anterior end truncated; oral field broad and opening anteriorly; adoral zone of membranelles dominant, terminated deeply near cytostome after spiraling around bell-edge in one turn; undulating membrane single-structured; frontoventral cirri arranged in two rows, which are formed by multi-anlagen during morphogenesis; 5 or more transverse well-developed cirri; marginal and caudal cirri absent.



Fourth step: determine the species;

An image with measurements gives: body length 105 µm, cirri 40 µm (measurements made with ImageJ): the dimensions in table 2 page 353 are compatible except for *G. intermedius* which is too small. The number of transverse cirri TC appears greater than 10 on our images, which would eliminate *G. smalli*, and *G. stentoreus* **Table 2 extracted from the link above:**

Species name	body length in µm	FVC, number*	TC, number	Ma, shape	MS, number	Reference
Table 2. Morphological comparison among the known <i>Gastrocirrhus</i> -species.						
<i>Gastrocirrhus intermedius</i>	68	9	7	oval	1	Lepsi 1928
<i>Gastrocirrhus monilifer</i> Called <i>Cirrhogaster monilifer</i>	95-105	10	12	moniliform	11-15	Ozaki and Yagiu 1942
<i>Gastrocirrhus monilifer</i> Called <i>G. adhaerens</i>	100	16	12	moniliform	ca 12	Fauré-Fremiet 1954
<i>Gastrocirrhus monilifer</i>	95-103	18	13	moniliform	10-12	Ito 1958
<i>Gastrocirrhus monilifer</i> Called <i>Cirrhogaster adhaerens</i>	ca 100	16	12	bead-like	-	Dragesco and Dragesco-Kerneis 1986
<i>Gastrocirrhus stentoreus</i>	104	11	5	-	-	Bullington 1940
<i>Gastrocirrhus smalli</i> comb. n. Called <i>Euplotidium smalli</i>	100-140	13-14	7	C-shaped	2	Lei <i>et al.</i> 2002
<i>Gastrocirrhus monilifer</i>	100-140	12-19	10	moniliform	10-14	this study
<i>Gastrocirrhus stentoreus</i>	80-130	ca 13	7-8	ribbon-like	1	this study

* Including frontal cirrus; - No data available

FVC - fronto-ventral cirri; Ma - macronucleus; MS - macronuclear segments; TC - transverse cirri.

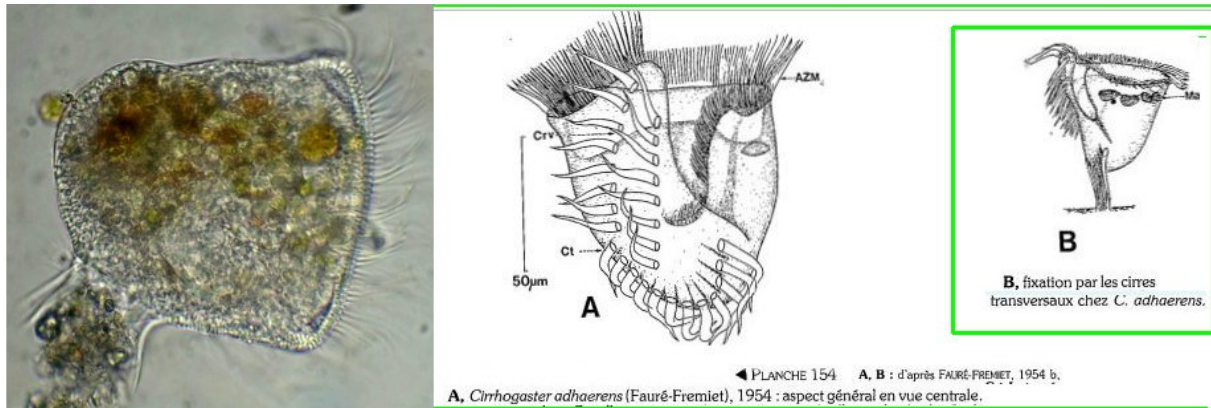
This table 2, on its right, gives us an additional clue: the old name of a species would be *Gastrocirrhus adhaerens*: the bibliographical references refer to a work: Dragesco and Dragesco Kerneis 1986.

Let's see this new track appearing in the work of a well-known French protistologist: Jean Dragesco:

https://horizon.documentation.ird.fr/exl-doc/pleins_textes/pleins_textes_6/Fau_trop/23159.pdf

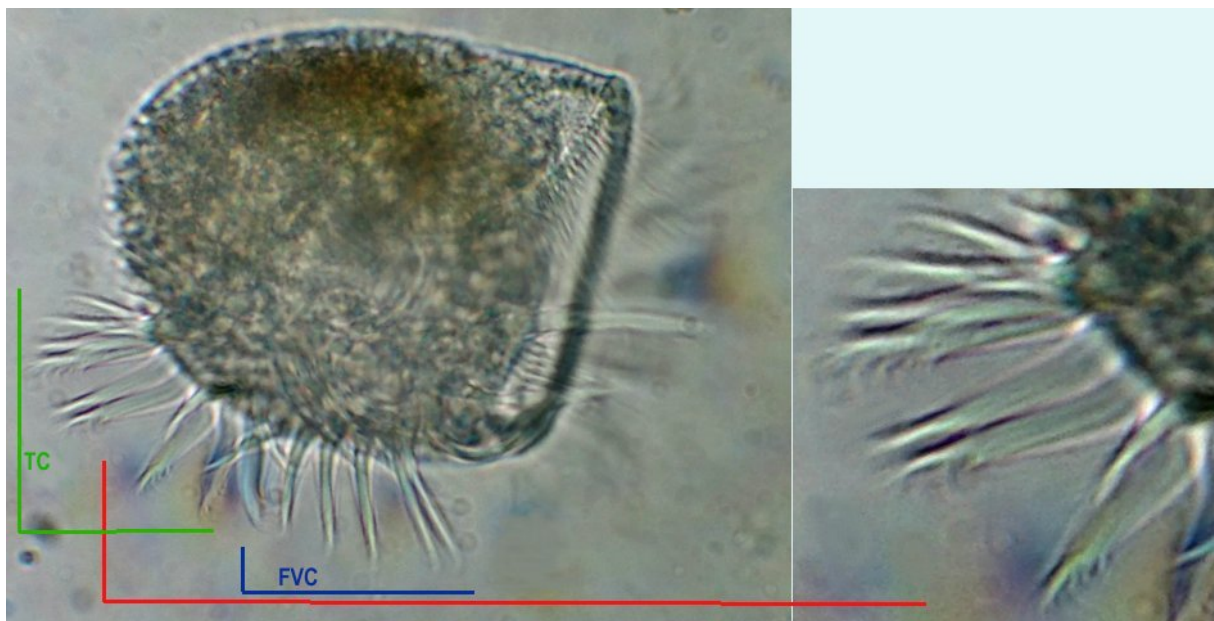
See page Page 513 and plate page 514 **

This drawing taken from the work by Dragesco and Kerneis, linked above shows a new characteristic (circled in green): fixation, by the so-called thigmotactic transverse cirri: (another unknown word! but the Greek root *thigmo* means: touch)



The image above on the left shows a fixing of our specimen, by its cirri, which resembles the drawing extracted on the right B: note that the observation of living specimens confirms this important element: it is difficult to separate them from their support to which they are firmly attached,

And by looking in the photos taken during the observation, the one below shows a particular structure of the transverse cirri TC which seem provided with claws or hairs and we can count a dozen transverse cirri; part of the fronto-ventral FVC cirri is hidden by the cytoplasm:



So by grouping the data, numbers of transverse cirri, reference to the old name *G. adhaerens* we can conclude that we are in the presence of *Gastrocirrhus monilifer*. The nuclei which are not visible could have confirmed this hypothesis. Another possibility could be *G. Trichocystus*, but apart from a drawing on a study in Japanese I did not find any other information. See Page 23 and 25 of the link below (from February 27, 1958). WoRMS relates it to *Gastrocirrhus monilifer*

<https://dl.ndl.go.jp/view/prepareDownload?itemId=info%3Andljp%2Fpid%2F10839621&contentNo=1>

Note in the part circled in green what seems to be hairs at the end of the transverse cirri!

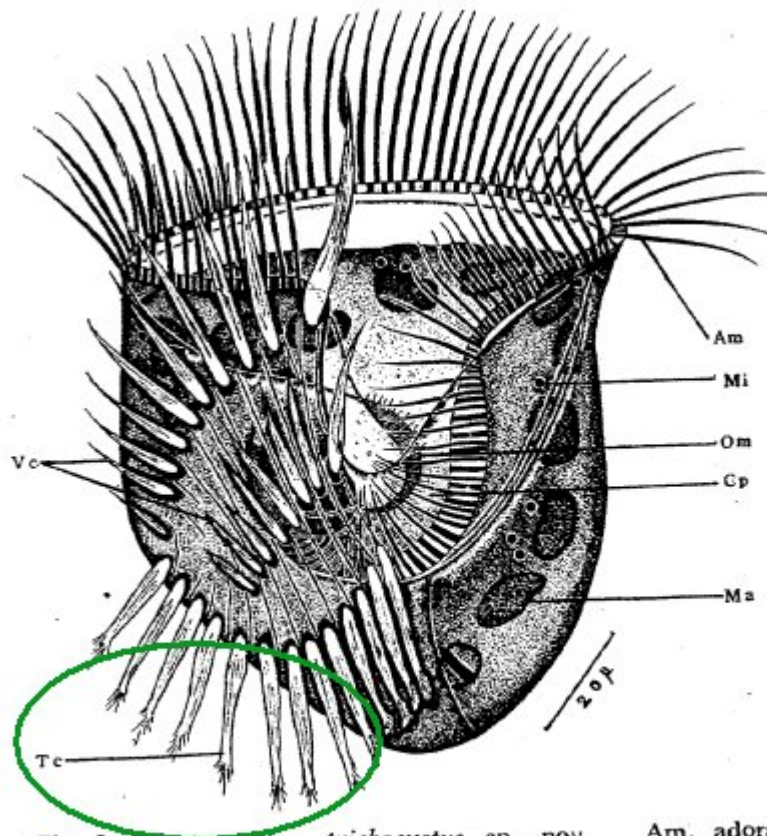


Fig. 2. *Gastrocirrhus trichocystus* sp. nov. Am, adoral membranellae; Cp, cytopharynx; Ma, macronucleus; Mi, micronucleus; Om, oral membranellae; Tc, transverse cirri; Vc, ventral cirri.

It should, in fact, be noted that a same species may have been designated by different names depending on the place and time of its observation. Moreover, the classification is constantly evolving by discovering new relationships between families.

This research was very interesting in itself and I hope that this hunt for clues has shown that one can, without expensive personal documentation, have access to references on the Internet even for rare species.

This method can be applied to other types of specimens by using the specific keys and proceeding step by step. Even if the documents found do not correspond exactly to what you are looking for, this is an opportunity to enrich your knowledge!

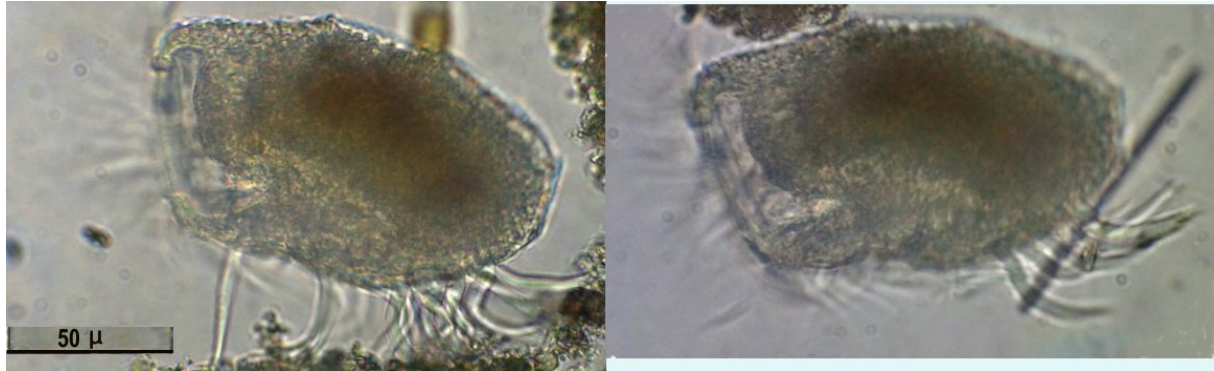
To learn more about the classification of Gastrocirrhidae in WoRMS:

<https://www.marinespecies.org/aphia.php?p=taxdetails&id=341298>

and for genus *Gastrocirrhus*:

<https://www.marinespecies.org/aphia.php?p=taxdetails&id=415410>

For readers who would like to continue this process, here are two images of a specimen found in the same conditions, but which seems quite different from *Gastrocirrhus*: Shape, size of the cytostome.... (can be euplotidium or paraeuplotidium?) so it's up to you !



**** Annexe:** free translation (by myself) of the description of *Gastrocirrhus* made in the work of J. Dragesco in link:

Very particular ciliates distinguished by a very large development of the fringe of membranelles which almost entirely bypasses the enormous, almost circular peristome indented opening only at the level of the cytostome[...] The right side of the peristome draws a descending lip partially covering the right side of the cytostome. The cilia include 10 to 16 frontoventral cirri arranged in two longitudinal rows and 12 transverse thigmostatic cirri (allowing temporary fixation) arranged in a semicircle. cirri length > 35 μm.

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