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Notes on distinguishing between the two species of hakes of
the Northwest Atlantic, *Merluccius bilinearis* and *Merluccius albidus*

by

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The two species of hakes, *Merluccius bilinearis* and *Merluccius albidus*, frequenting the Northwest Atlantic, have been described by Mitchill in 1814 and 1818 under the name of *Stomodon bilinearis* and *Gadus albidus*, respectively. Later they have been confused by various authors who studied and placed them synonymously under the name *Merluccius bilinearis*.

In 1954 Ginsburg, examining preserved specimens at the US National Museum, records that it is a matter of two different species and gives them genesis and specific names. In 1955 Bigelow and Schroeder confirm the existence of the two species and show that *M. albidus* has metric and meristic characteristics which place it very close to the European hake, *Merluccius merluccius*. Nevertheless, these comparisons apply to only some individuals (about twenty). Is the distinction of the two species by Ginsburg from the preserved reference collection of specimens also unique?

Also, based on a more important statistical study than that of preceding authors, we have set out to define a certain number of metric and meristic characteristics allowing us to distinguish the two types. The study is on 293 *M. bilinearis* and 98 *M. albidus* taken during cruises on the R/V *Cryos* on Georges and Nova Scotia Banks in 1971.

I. Body proportions

Among the metric characteristics used to differentiate two different species, we have used some (Fig. 1) as follows:

- Lateral head length: $Lcpl$, measured from the end of the snout to the upper angle of the operculum,
- Pre-dorsal distance: $D 1$, from the end of the snout to the first ray of the first dorsal fin,
- Pre-anal distance: A , from the end of the snout to the first ray of the anal fin,
- Eye diameter: O .

These measurements, in mm, are compared in the first three cases with the total length, in the last case with the length of the head and are expressed as indices:

- cephalic index $\frac{100 Lcpl}{LT}$; pre-anal distance $\frac{100 A}{LT}$;
- pre-dorsal distance $\frac{100 D 1}{LT}$; eye diameter $\frac{100 O}{Lcpl}$.

The fish studied measured from 11 to 42 cm for *M. bilinearis* and from 30 to 42 cm for *M. albidus*.

1) Lateral head length: $Lcpl$

M. bilinearis. The index $\frac{100 Lcpl}{LT}$ was calculated for 285 individuals and varies from 22.0 to 25.3 (mode 23.6 - mean 23.69).

M. albidus. The same index varies from 23.8 to 26.1 (mode 25.1 - mean 24.48).

In the two species the relative head length is not notably different; it is appreciably smaller in *M. albidus* than in *M. bilinearis*.

2) Pre-dorsal distance: D 1

M. bilinearis. The index $\frac{100 D 1}{LT}$ varies from 24.3 to 27.4 with a mode at 26.0 (mean 25.95).

M. albidus. The same index varies from 25.3 to 28.0 with two modes, one at 26.2, the other at 26.8-26.9. The average value is 26.60.

The value of these two indices is very close for the two species; it is perhaps a little greater in *M. albidus*.

3) Pre-anal distance: A

In *M. bilinearis* $\frac{100 A}{LT}$ lies between 38.0 and 43.2 with two modes, the first at 40.1, the second at 40.7; mean value is 41.53.

In *M. albidus* it varies from 40.0 to 44.8 without a well-defined mode; its mean value is 42.35.

4) Eye diameter: O

The diameter of the eye is only slightly larger for *M. albidus* than for *M. bilinearis*; their mean values are 20.4 and 20.1, respectively. In the first, the index $\frac{100 O}{LT}$ is between 18.2 and 24.2 without a mode, while in the second it varies from 17.8 to 24.3 with modes at 19.7-20.0 and 20.3.

In summary, the body proportions are, on the whole, very little different in the two species of hakes and too close to permit a distinction.

II. Meristic characters

Certain meristic characters, such as the number of fin rays, vertebrae and branchiostigites, are excellent means of distinguishing the two species (Fig. 2).

1) Dorsal fin rays

- First dorsal

M. bilinearis. The number of first dorsal rays varies from 11 to 15, the mode is 12 and the mean value 12.32.

M. albidus. The number of rays is 10 to 13, the mode 11 and the mean 11.31.

M. bilinearis has, on the average, one ray more than *M. albidus*, and in the two species the variations in number of rays are of little importance.

- Second dorsal

M. bilinearis has from 36 to 43 rays (mode 40, mean 39.65).

M. albidus has from 36 to 40 rays (mode 39, mean 38.87).

Concerning the second dorsal, the difference is less marked than for the first; if the mode accentuates a divergence from a similarity between the two species, the mean values are very close.

2) Anal fin rays

M. bilinearis. The number of rays is between 37 and 44 (mode 41, mean 40.62).

M. albidus has from 36 to 41 rays (mode 38-39, mean 38.44).

The difference between the two species is much less for the anal fin than for the two dorsals; *M. bilinearis* has on the average two more rays than *M. albidus*.

3) Vertebral numbers

The hakes have well-developed transverse processes which permit separation of the vertebral column in three parts. The vertebrae have been counted by groups: cervical, thoracic, and caudal (including the urostyle), then added to give the total number per individual.

M. bilinearis. In the hakes, the distribution of the vertebrae is as follows:

- cervical: 7 (6 in 4 cases)
- thoracic: 20 to 22 (19 in 3 cases)
- caudal: 26 to 29 (25 in one case).

The total number varies from 52 to 57, the mode is 55 and the mean is 54.75.

M. albidus. In this species the vertebral division is as follows:

- cervical: 6 (7 in 2 cases)
- thoracic: 19 to 21
- caudal: 27 to 29.

The total vertebral number is between 53 and 56, the mode being 54-55 and the mean 54.37.

The average vertebrae of the two species are very close, however, one character separates them: *M. bilinearis* has one cervical vertebra more than *M. albidus*.

4) Number of branchial spines

We have counted the branchial spines of the first branchial arch and the right and left arches not always being symmetrical, the count has been made of both sides for each fish.

M. bilinearis. The number of branchial spines varies from 14 to 20 for the right and left sides, the mode is 17, the mean value in the first case is 17.53 and 17.59 in the second case.

M. albidus. For the right branchial arch this number varies from 8 to 11 and for the left from 9 to 11. In the two cases, the mode is 10 and their mean values are 10.17 and 10.20, respectively.

The variation in the amplitude of branchial spines is high in the first species as against very low in the second. Their number is always clearly distinct. Consequently, is this character a good means of separating the two species?

In summary, certain meristic characteristics allow us to clearly differentiate *M. bilinearis* from *M. albidus*, and the simplest separator is the number of branchial spines.

Conclusion

The two types of Northwest Atlantic hakes should not then be merged and represent two very different species as shown by Ginsburg. Besides the characters we have studied, others also separate them. Those are, for example, coloration, scale numbers, peritoneal color and form of the otoliths.

References

- Bigelow, H.B., and W.C. Schroeder. 1955. Occurrence off the Middle and North Atlantic United States of the offshore hake, *Merluccius albidus* (Mitchill) 1818, and of the blue whiting, *Gadus (Micromesistius) poutassou* (Risso) 1826. *Bull. Mus. comp. Zool. Harv.*, Vol. 113(2), p. 205-226.
- Ginsburg, I. 1954. Whittings on the coasts of the American continents. *Fish. Bull. U.S.*, Vol. 56, No. 96, p. 187-208.
- Leim, A.H., and W.B. Scott. 1966. Fishes of the Atlantic coast of Canada. *Bull. Fish. Res. Bd. Canada*, No. 155, p. 205-208.

- Lozano Cabo, F. 1965. Las merluzas atlanticas. *Dir. Gen. Pesca Mar., Espana, Pub.*
No. 4, p. 11-31.
- Mombeck, F. 1970. Notes on the distinction of Northwest Atlantic hakes, *Merluccius*
albidus and *M. bilinearis*. *Annu. Meet. int. Comm. Northw. Atlant. Fish.*,
Res.Doc. 70/91, 3 p.

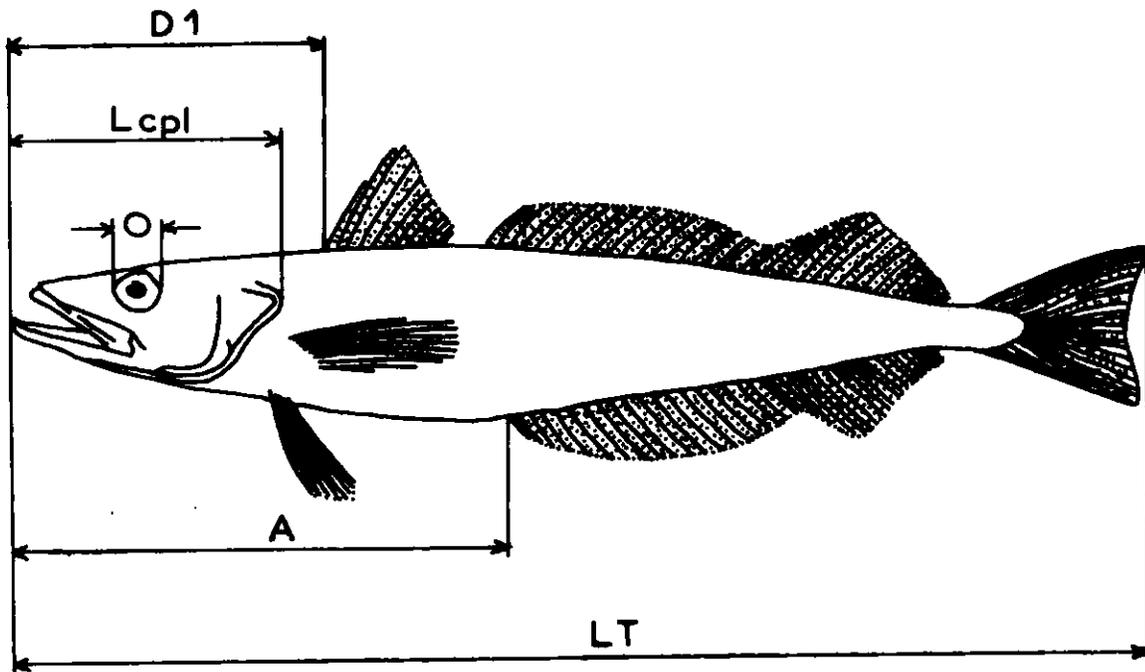


Fig. 1. Measurements taken.

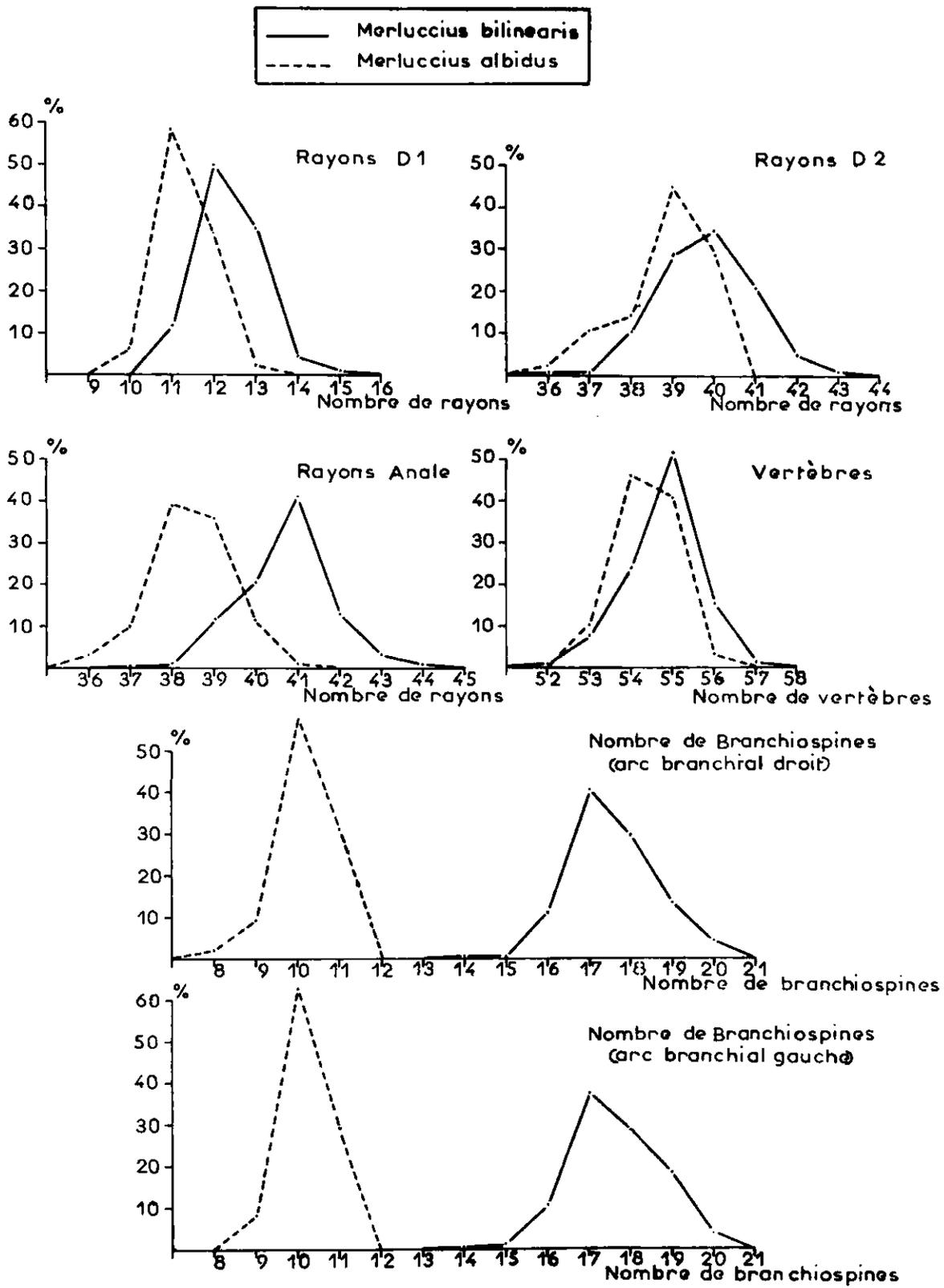


Fig. 2. Frequencies of numbers of dorsal rays (D1 and D2), of anal rays, of vertebrae, and of branchial spines (right and left branchial arches).



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CORRIGENDA

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NOTE:

Title has been changed from "Notes on distinguishing between..... *albidus*" to the above.

Page 1.

2nd Paragraph, last 2 lines: Please replace the sentence "Is the distinction....unique?" by "In addition, the distinction of the two species by Ginsburg is only made from the preserved reference collection of specimens."

Page 2.

II. Meristic characters

1st Paragraph, line 2: Please replace the word "branchiostigites" by "gill-rakers".

II. Meristic characters

2) Anal fin rays

3rd Paragraph, line 1: Please change the words "The difference between the two species is much less for" to "The difference between the two species is more clear".

Page 3.

4) Number of branchial spines

Please change title of 4) above from "Number of branchial spines" to "Number of gill-rakers"

1st Paragraph, line 1: Please change the words "branchial spines" to "gill-rakers"

5th Paragraph, lines 2-3: Please change the words "branchial spines" to "gill-rakers".

Page 6.

Fig. 2 caption, line 2: Please change the words "branchial spines" to "gill-rakers".

