# Comparative genetic and morphometric characterization of sympatric populations of *Heterobranchus bidorsalis* and *H. longifilis*

**W.A. Olaniyi*, F.A. Akinsemolu, D.J. Ogunyemi and O.G. Omitogun**

*Department of Animal Science,
Adekunle Ajasin University, Akungba-Akoko,
Ondo State, Nigeria.

# INTRODUCTION

- *Heterobranchus bidorsalis* Geoffroy Saint Hilaire, 1809 and *H. longifilis* Valenciennes, 1840 (Teugels *et al.*, 1990).

- The present study has employed molecular analysis using blood serum protein in addition to morphometry for characterization of the sympatric *Heterobranchus* species

# Materials and Methods

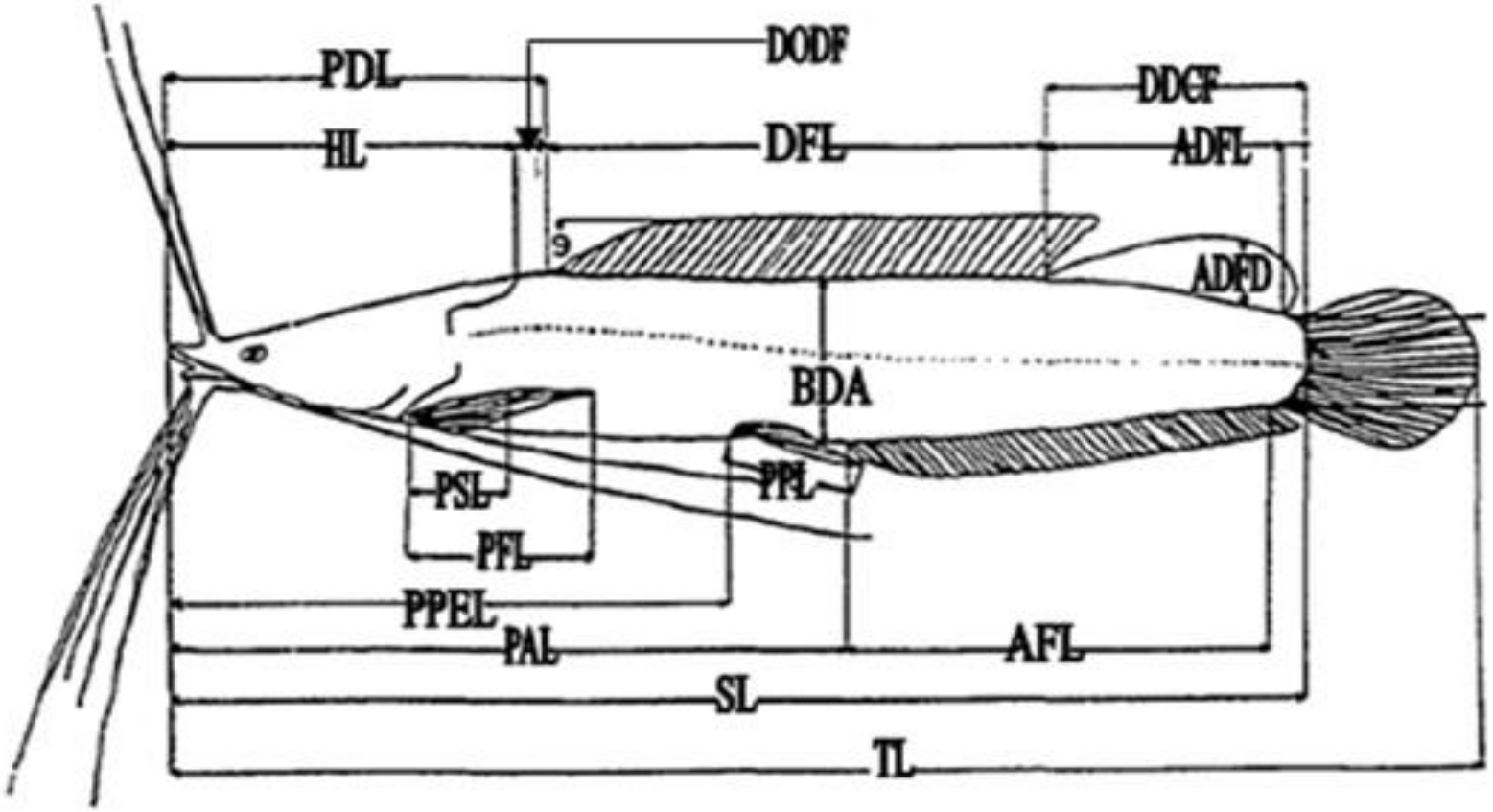
- **Serum preparation:** 0.9% NaCl was added at 3:2 blood samples; and left at ambient temperature for 1 h; centrifuged at 3,000 rpm for 10 min. The supernatant was stored at -20 °C for further analysis (Avtalion, 1984; Betiku and Omitogun, 2006).

- **Gel preparation:** SDS-PAGE gel was carried out using the Bio-Rad Mini Protean II Cell kit of 10 ml capacity. A discontinuous buffer system analysis was employed. Solutions for 4% stacking gel, 12% resolving gel was prepared (Bio-Rad, 1995).

- **Sample preparation for SDS-PAGE:** 30-40 µl of 7.5 % β-mercaptoethanol was added to 370 µl of sample buffer. Each of 10 µl protein sample, 40 – 60 µl of mixture of sample buffer plus β-mercaptoethanol was added at ratio 1:5. Prepared samples were heated at 95 °C for 4 min for denaturation. Thereafter 10 µl each was loaded.

- **Staining and de-staining:** After the electrophoretic run, the gels were stained in 0.1% Coomassie blue in glacial acetic 1:4 methanol for ~ 1 h. Thereafter, the gels were destained with 60% glacial acetic 1:4 methanol solution for ~3hrs. The gel was then documented.

- **Data analysis:** Gel was scored for presence (1) or absence (0) of protein bands. Data were log transformed and analysed with PAlaeontological STatistics (PAST) software to generate dendrograms. Mean value of each species was employed to generate distance indices data for comparative genetic distance evaluation choosing Dice option.




TL, total length; SL, standard length; HL, head length; PAL, pre-anal length; PPL, pre-pelvic length; PPEL,pre-pectoral length; PDL, pre-dorsal length; DFL, dorsal fin length; ADFL, adipose fin length; ADFD, adipose fin depth; AFL, anal fin length; PFL, pelvic fin length; DFR, dorsal fin ray; AFR, anal fin ray

# Results and Discussion

**Table 1.** Measurements and meristic counts for population of *H. bidorsalis* and *H. longifilis*

| | | *H. bidorsalis* | | | *H. longifilis* | |
|---|---|---|---|---|---|---|
| Parameters | n | mean | SD | N | mean | SD |
| TL (cm) | 32 | 51.7 | 4.1 | 35 | 53.7 | 4.6 |
| SL (cm) | 32 | 45.9 | 3.7 | 35 | 47.1 | 3.9 |
| | | | %SL | | | |
| HL | 32 | 29.9 | 0.9 | 35 | 31.2 | 1.4 |
| PAL | 32 | 58.4 | 3.3 | 35 | 63.2 | 4.3 |
| PPL | 32 | 48.0 | 1.6 | 35 | 49.4 | 2.3 |
| PPEL | 32 | 21.7 | 1.5 | 35 | 23.0 | 1.3 |
| PDL | 32 | 34.6 | 1.2 | 35 | 38.6 | 2.2 |
| DFL | 32 | 42.3 | 1.7 | 35 | 35.2 | 1.7 |
| ADFL | 32 | 23.4 | 1.1 | 35 | 25.7 | 3.2 |
| ADFD | 32 | 4.2 | 0.5 | 35 | 4.4 | 0.6 |
| AFL | 32 | 38.7 | 2.2 | 35 | 34.3 | 2.6 |
| PFL | 32 | 10.5 | 1.0 | 35 | 9.7 | 1.2 |
| | | | Fin Rays | | | |
| | | Min-Max | | | Min-Max | |
| DFR | 32 | 40-45 | | 35 | 26-32 | |
| AFR | 32 | 39-55 | | 35 | 26-41 | |

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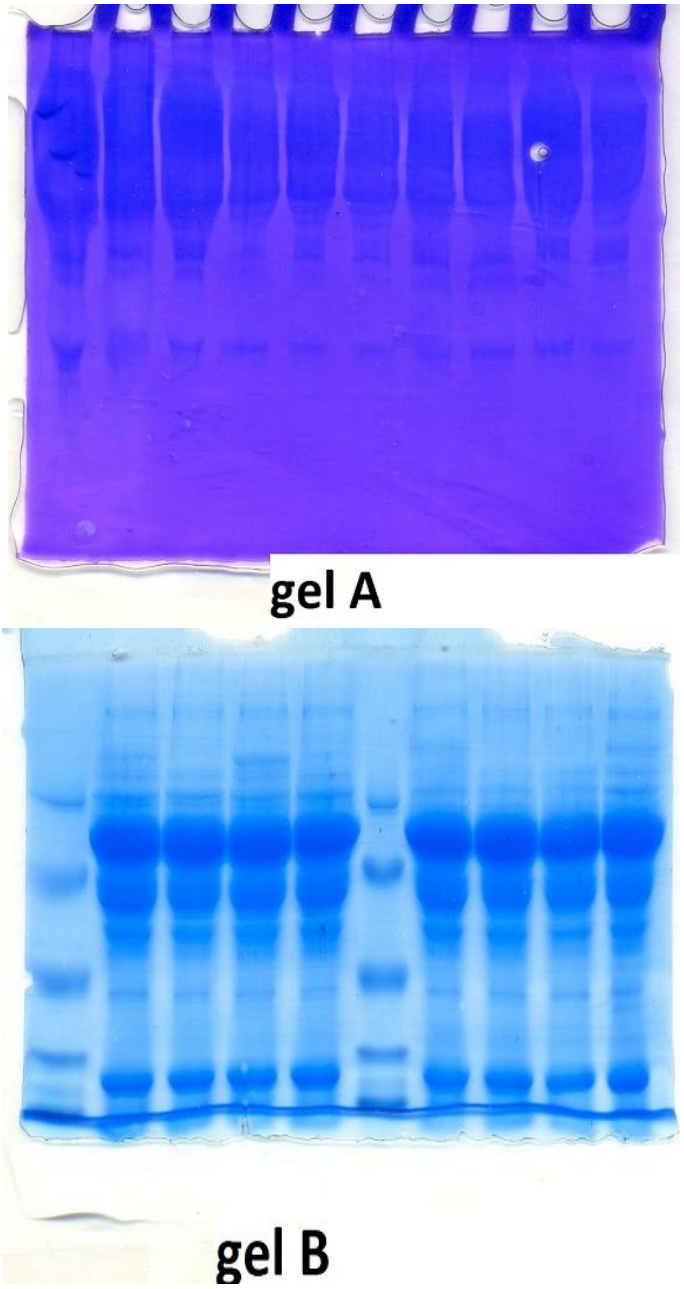


**Figure 1.** SDS-PAGE representative gels of the samples revealing sera protein bands; gel A, H. *longifilis*; and gel B, *H. bidorsalis*.

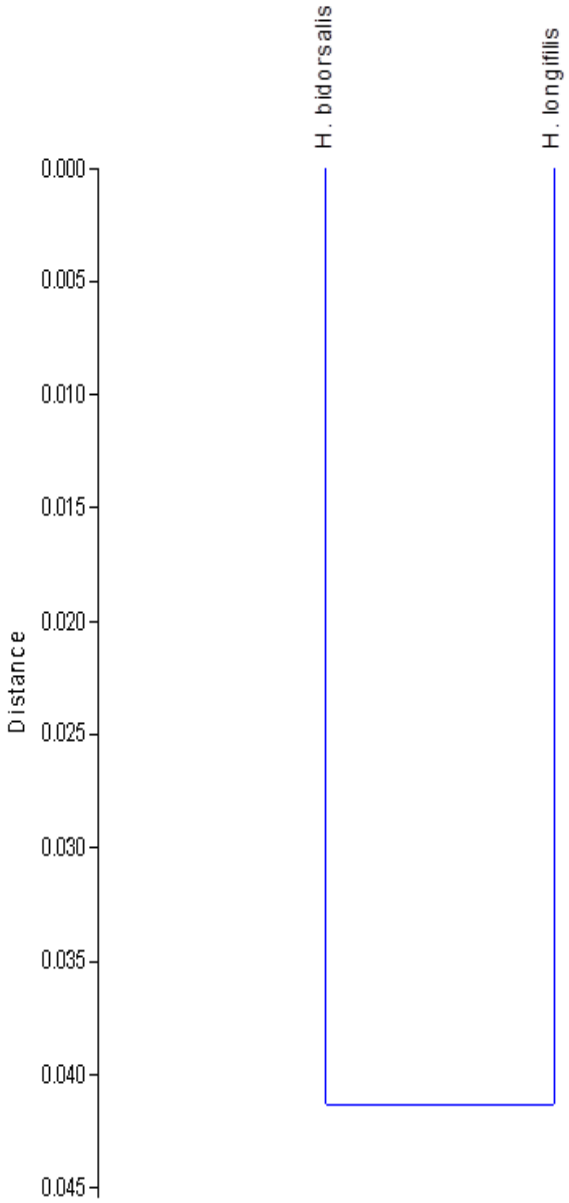


**Figure 2.** Dendogram showing genetic relationships between *H. bidorsalis* and *H. longifilis* species

# Conclusion

- Both species are closely related genetically but significantly different i.e. not the same. Therefore, they are very close substitutes for each other especially in breeding programs such as hybridization. The hyper-development of the adipose attributes quickly assists in their identification.

# References


Akinwande, A.A., Moody, F.O., Umar, S.O. (2009). Growth performance and survival of *Heterobranchus longifilis*, *Heterobranchus bidorsalis* and their reciprocal hybrids. *Afri. Sci.* 10 (1): 15-18.

Aluko, P.O. (1995). Growth characteristics of first, second and backcross generations of the hybrids between *Heterobranchus longifilis* and *Clarias anguillaris*. *NIFFR Annual Report,* New Bussa, Nigeria. 74 – 78pp.

Ataguba, G.A. Annune, P.A. and Ogbe, F.G. (2009). Induced breeding and early growth of progeny from crosses between two African clariid fishes, *Clarias gariepinus* (Burchell) and *Heterobranchus longifilis* under hatchery conditions. *J. Appl. Biosci.* 14: 755-760.

Avtalion, R.R. (1984). Preparation of PAGE and agar gels. In: Ferreira, J.T. (eds.) Workshop on fish genetics, 8-9th August, 1984, Rand Afrikaans University, South Africa.

Legendre, M., Teugels, G.G., Canty, C., and Jalabert, B. (1992). A comparative study on morphology, growth rate and reproduction of *Clarias gariepinus* (Burchell 1822), *Heterobranchus longifilis* (Valenciennes, 1840), and their reciprocal hybrids (Pisces: *Clariidae*). *J. Fish Biol*. 40: 59-79.

Betiku, O.C. and Omitogun, O.G. (2006). Genetic diversity of commercial *Clarias gariepinus* population revealed by Sodium dodecyl sulfate-Polyacrylamide gel Electrophoresis (SDS-PAGE). In: *Proceedings of the 31st Annual Conference of the Genetics Society of Nigeria,* 2006. 135-140 pp.

Bio-Rad (1995). Bio-Rad Mini Protean II Cell Instruction Manual (1995).

Teugels, G.G. (1982). Preliminary results of a morphological study of five African species of the subgenus *Clarias* (Pisces: Clariidae), *J. Nat. Hist.* 16: 439-464.

Teugels, G.G., Denayer, B., and Legendre, M. (1990). A systematic revision of the African catfish genus *Heterobranchus* (Pisces, *Clariidae*). *Zool. J. Linn Soc.* 98: 237-257.

*I thank you for your attention*