The BRAINS Table in FishBase

Most fishes have small brains, at least when compared with warm-blooded vertebrates. However, holding this against them would be as silly as trying to draw inference about the worth of different groups of people from the size of their brains (Gould 1981).

Rather, we should realize that fish have evolved the brain size they need, and then use the brain size difference among species of fish to draw inferences on their 'needs', i.e., on their niche (see, e.g., Bauchot et al. 1989). The brain size database assembled by Roland Bauchot and his collaborators and kindly made available for inclusion as a table of FishBase allows inferences of this sort. The following describes, based on Bauchot and Bauchot (1986), how this database was created.

Over 2,800 brains were dissected from over 900 species of teleost fishes (see Fig. 1). Many of the fishes were collected at tropical and subtropical localities such as the Hawaiian and Marshall Islands, New Caledonia, Queensland, Australia, the Philippines, southwest India, Mauritius and Réunion, Gulf of Oman, northern Red Sea, Senegal and the Caribbean, but also in France and the North Atlantic. All fish were weighed before removal of the brain and their standard and/or total length taken. The brain was cut from the spinal cord at the first spinal nerves, the meninges and blood vessels removed, blotted and weighed, and then preserved in Bouin solution. Because juveniles have a larger brain relative to body weight than adults (Bauchot et al. 1979), it was mostly adult fishes which were used for comparative studies. However, some series were also obtained which range from juveniles to large adults, thus allowing the study of ontogenic changes in brain size. Figure 1 shows the relationship between relative brain weight and body weight.

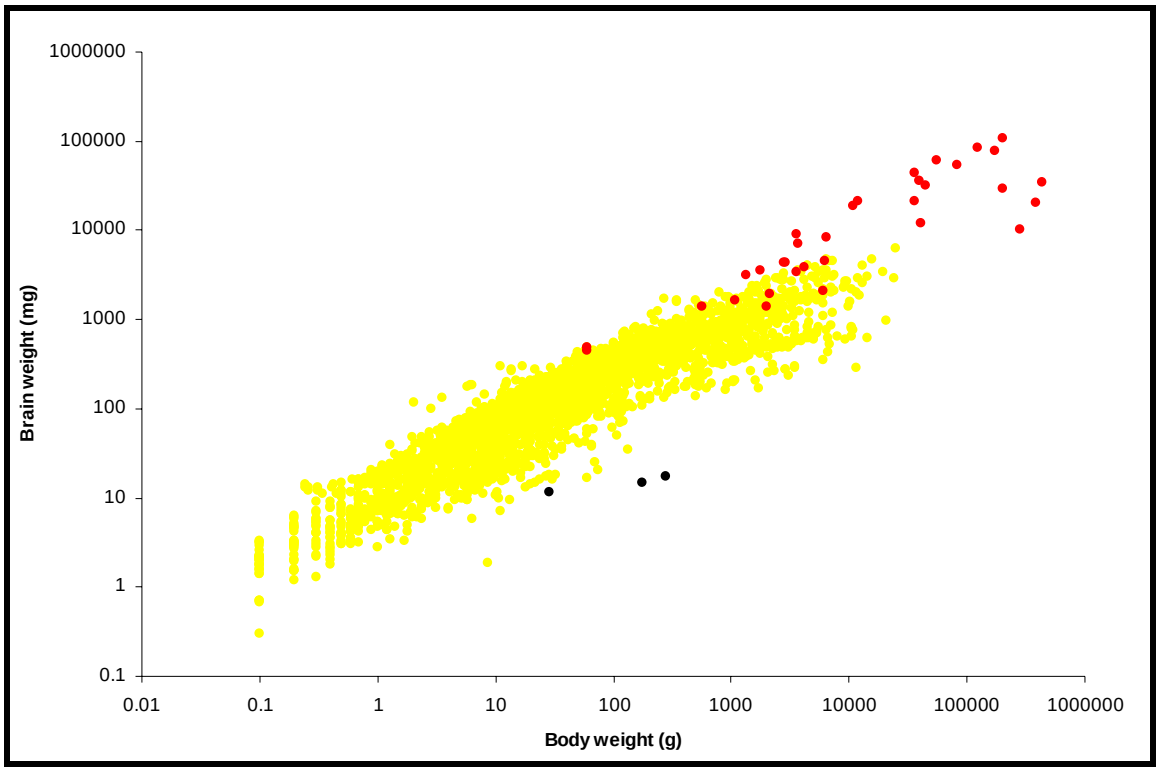

Fig. 1. Relationship between relative brain weight and body weight. Yellow dots: ray-finned fishes; red dots: data for sharks and rays, which have large brains, possibly to support their electrosensing ability. In contrast, the 3 black dots below the cloud belong to lampreys.

Subsequently we added about 200 more records. A paper that analyzes the extended dataset has been published (Albert et al. 1999). Also, Ms. Xiomara Chin, Institute of Marine Affairs, Trinidad & Tobago contributed brain weights obtained during her thesis work (Chin 1996).

The records thus obtained are linked in FishBase to their current species names, and consist of the following elements:

- brain weight (in mg);
- body weight (in g);
- a first encephalization coefficient (a calculated field = brain weight / body weight);
- a second encephalization coefficient, standardizing for body weight (a calculated field = brain weight / body weight)2/3;
- body length (SL and/or TL, in cm).

These single records are presented for each species in the form of a table, with at least one, and up to 73 individuals.

Internet

The BRAINS table can be accessed by clicking on the **Brains** link in the 'More information' section of the 'Species Summary' page. You can create a list of all species with available data by

selecting the **Brains** radio button in the 'Information by Topic' section of the 'Search FishBase' page. If you select the **Graphs** radio button in the 'Information by Family' section of that page, you can create **Relative brain weight** graphs for different families.

Acknowledgments

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