

Although the skeletal elements of the higher and lower bony fishes basically correspond, some of the names of the bones will be different due to specialization and particular adaptations. For example, there is no true mesethmoid in the salmon (Norden 1961:727). It has a supraethmoid bone which is not present in the cod, rockfish, or halibut. A further example is the basihyal of the salmon which is cartilaginous, overlaid with a well-ossified lingual plate (Norden 1961:734). It is the lingual plate which survives archaeologically. The basihyal of the rockfish and halibut is completely ossified. The cod has no basihyal.

Method of Specimen Preparation

For all intents and purposes, this manual is meant to supplement and complement a comparative fish bone collection. It is not intended to be a total replacement for a comparative collection, and the importance of access to such a collection for precise identification must be stressed. Adequate collections, however, are not always available, and the services of a specialist can be difficult to obtain and expensive. Making up a basic fish collection may be difficult and time consuming, but it is sometimes the only solution. What follows, is a short description of the method used for the preparation of specimens for the present manual.

The method of maceration used was a modification of the enzyme-base laundry presoaker and warm water technique described in Casteel (1976). The fish specimen was first gutted, being careful not to cut or remove any bones. To accelerate the maceration process, the fish was lightly steamed until superficial flesh flaked off easily. This excess flesh was carefully removed without damaging any bones. The remaining carcass was then left submerged in a strong presoaker solution for a few days, with checks on its progress made every day. Accurate graphic representation of the individual bony elements required a skeleton that was in the best condition possible. This meant that constant monitoring was necessary to ensure that the bones did not warp, dry-out, or begin to break down.

When the cartilage appeared to be sufficiently dissolved, the skeleton was removed in sections (ie. caudal, left and right pectoral, pelvic, and lateral facial sections, etc.). The neurocranium tended to take the longest to disarticulate. The bones were removed from the solution while they were still attached but soft enough to separate easily by hand. In this way left and right sides were not

confused, and the articulated bones could be compared with the drawings in biological studies.

Once separated, the bones were hand cleaned under tepid water. Care was taken to work over a fine-meshed screen. Finally, the bones could be laid out to dry and later labelled.

The process used here was painstaking and time consuming. This was necessary in order to identify elements in comparison with the articulated drawings and descriptions of zoological osteologies. It is hoped that with the aid of the present manual, much quicker and more effective maceration techniques could be used (see Casteel 1976:7-16). During the maceration process, it should not be necessary to maintain articulations, or separate left from right, as these precise element identifications can be made later with reference to the drawings in this manual. However, it is important to stress again that for the recognition of morphological differences between various species, and their precise archaeological identification, a comparative osteological collection is essential. This manual is only intended as a useful adjunct to such a collection. It can be used in field situations in which the fragility of comparative fish collections makes their use impractical, and can also help prevent the deterioration of a collection by reducing the amount of handling required in laboratory analysis.

References: for the identification of whole specimens- Hart (1973) for Pacific species; Wheeler (1969) for Atlantic species.

Additional Notes

Although an attempt has been made to produce osteologies as complete as possible, some bones have been omitted. The otoliths of the salmon (*Oncorhynchus keta*) are so small as to make a to-scale drawing useless. Included is a detailed series of enlarged drawings of salmonid otoliths redrawn after Norden (1961). In addition, the following bones are absent: the extrascapulars of the salmon, suborbitals 4 and 5 of the rockfish, and the supratemporals, and orbitals of the halibut. Drawings of the extrascapulars and supratemporals were not attempted because they are merely a thin line of tubular bones enclosing a sensory canal. The orbitals of the halibut and supraorbitals 4 and 5 of the rockfish were omitted for the same reason. These bones are all extremely small or fragile, and therefore are not considered of essential importance. Their recovery is unlikely in archaeological sites.