

THE GRAMMAR OF FAMILY-GROUP NAMES AS EXEMPLIFIED BY THOSE OF FISHES

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Abstract.—A review of the family-group names cited in *Fishes of the World* (Nelson, 1976) revealed that 71 of the approximately 900 names were in some way contrary to the Rules of Zoological Nomenclature or Latin grammar. These cases are discussed and corrections given to illustrate certain principles of nomenclatural grammar.

The review by Hubbs (1978) of *Fishes of the World* (Nelson, 1976) suggested to me that Nelson's work might serve as the basis of a review of the formation and grammar of family-group names, with the 450 names of families of fishes, as well as the equally large number of subfamily, tribal, and suprafamilial names serving as a quite typical example. The availability of such a large part of the family-group names in zoology under one convenient and timely cover serves well the general subject of biological nomenclature, and I hope that the results of this review of the names will promote at least to a small extent the regularity and stability of nomenclature.

The current nomenclature of the highest categories of fishes is shown to be no worse and perhaps somewhat better than that of other comparably sized branches of Animalia. I discuss here all cases that I consider to be in need of correction. I found 71 such cases among approximately 900 names. I give reasons for my opinions and mention some cases that are perhaps questionable and discuss them. It is hoped thereby to illustrate many similar cases in other groups of animals.

Although the source of the majority of generic and family-group names is classical Greek, the basis of their grammar is Latin, recognized in general in Article 11 (b) of the International Code of Zoological Nomenclature and also in Article 29, which concerns the grammatical procedure for forming family-group names based upon the name of a type-genus, sometimes known as a basonym.

The group names here discussed are those formed upon a basonym to which suffixes and compounding elements are added. Suffixes are formative elements not derived from a base word. Such are *-idae* (for families), *-inae* (for subfamilies), and *-ini* (for tribes). Compounding elements are based upon a word to which an ending or endings indicating case, number, and gender are added when the compounding element is final in the name. When the element is nonfinal only a combining vowel is usually added to it. The

complete compounding element when final is often treated as a suffix, such as -oidea, -oidae, -oidei (based upon Greek *eidos* 'form, shape,' for superfamilial and subordinal names), -morpha (from Greek *morphē* 'form,' for superordinal names), and -formes (from Latin *forma* 'form,' for ordinal names). Of these, the International Code recognizes only -idae and -inae for regular use and recommends -oidea for superfamily names and -ini for tribal names. Nelson uses -oidae instead of -oidea for the superfamily rank and -oidei for suborders. There is some potential confusion in the use of -oidae for the superfamily rank, inasmuch as a genus name ending in -oa would form a family name ending in -oidae. Names for other higher ranks are not based upon a genus name and are not regulated by the Code.

Whatever formative element is used, it is applied to the stem of the basonym, the part of the genitive case of the name left when its case, number, and gender ending (French *désinence*) is subtracted. The form of the genitive case is cited in classical dictionaries. A few examples follow.

a) The Greek word *ichthys* 'fish' is cited in the Liddell and Scott Greek-English Lexicon (using classical Latin transcription and omitting accent marks, which are irrelevant to nomenclature, and references): "*ichthys* *yis*. *ho*, acc. *ichthyn*," etc. This indicates by '*yis*' (in literal transcription *yos*) that *ichthyis* is the genitive and *ichthyn* (in nomenclature, incidentally) is the accusative, thus showing that *ichthy-* is the stem, and that the gender is masculine by citation of the masculine article '*ho*.'

b) The Greek word *stoma* 'mouth' is cited in the Liddell and Scott Lexicon: "*stoma*, *to* . . . gen. *stomatis*," etc. This indicates by the article '*to*' that the gender is neuter and by '*stomatis*' (in literal transcription *stomatos*) that the stem is *stomat-*.

c) The Latin word *conger* 'sea-eel' in Harper's Latin Dictionary: "*conger* (access. form *congrus*, acc. to . . .) *gri*, m.," etc. This indicates that the genitive is *congrī* and that the stem is therefore *congr-*, and by 'm.' that the gender is masculine. There is also an indication that the word in Latin is a loan-word from Greek.

d) The Latin word *salmo* 'a salmon' is cited in Harper's Dictionary: "*salmo*, *ōnis*, m.," etc., thereby indicating that the genitive is *salmonis* (with a long *o* upon which the stress falls), that the stem is therefore *salmon-*, and that the gender is masculine.

A little knowledge of how words are declined in the classical languages is necessary in order to recognize what part of the genitive case of the word is the stem. Enough knowledge of the Greek writing system to enable a systematist to use a Greek dictionary is not at all a formidable task and is well worth the trouble. Anyone who deals with nomenclature should also clearly recognize the difference between literal and classical transcription from Greek to Latin, for example that *cetus* is the classical Latin transcription of a Greek word transcribed literally as *kētos*.

Cases

A. The many family-group names formed with *-ichthys* as the last element of the basonym are correctly cited, e.g., *Derichthyidae* from *Derichthys* and *Nemichthyidae* from *Nemichthys*. However, when the final element is given the Latinized form *-ichthus* the stem must be *-ichth-*. Therefore, *Ophichthidae* and *Ophichthinae* (from *Ophichthus*) are correct, but

1) *Ophichthyoidae* must be a lapsus for *Ophichthoidae*.

Inasmuch as *Pteroidichtys* Bleeker may be considered an obvious lapsus or error for *Pteroidichthys*, the name of the subfamily *Pteroidichthyinae* cited by Nelson can be considered correct.

B. Basonyms in *-is* are to be treated variously according to the grammatical properties of the words they end. The most numerous category of *-is* names is of feminine gender and has the genitive in *-idis* with the stem therefore in *-id-*. The following generic names are cited in Greek lexicons as having such stems: *Cobitis*, *Echeneis*, *Eleotris*, *Engraulis*, *Heterotis* (cf. *Myosotis* in botany), *Latris*, *Liparis*, *Monocentris* (*Centris*), *Pempheris*, *Pholis*, *Scorpis*. Therefore,

- (2) *Cobitidae* should be *Cobitididae*;
- (3) *Cobitinae* should be *Cobitidinae*;
- (4) *Echeneidae* should be *Echeneididae*;
- (5) *Eleotridae* should be *Eleotrididae*;
- (6) *Engraulidae* should be *Engraulididae*;
- (7) *Ephippinae* should be *Ephippidinae*;
- (8) *Heterotinae* should be *Heterotidinae*;
- (9) *Latridae* should be *Latrididae*;
- (10) *Liparinae* should be *Liparidinae*;
- (11) *Monocentridae* should be *Monocentrididae*;
- (12) *Pempheridae* should be *Pempherididae*;
- (13) *Pholinae* should be *Pholidinae*;
- (14) *Scorpininae* should be *Scorpidinae*.

The name *Cranoglanis*, formed on *glanis*, is also in this category, but the name cited by Nelson, *Cranoglanididae*, is correct.

Names in *-aspis* have the stem *-aspid-*; all are correct.

Names in *-lepis* have the stem *-lepid-*. *Grammicolepididae*, *Muraenolepididae*, *Paralepididae*, and *Zaniolepididae* are correct, but

- (15) *Muraenolepoidei* should be *Muraenolepidoidei*, and
- (16) *Pristolepinae* should be *Pristolepidinae*.

Names in *-batis* have the stem *-batid-*. The following require correction:

- (17) *Anacanthobatinae* should be *Anacanthobatidinae*;
- (18) *Arhynchobatinae* should be *Arhynchobatidinae*;
- (19) *Batoidimorpha* should be *Batidoidimorpha*; and

(20) Myliobatidae and Myliobatinae should be Myliobatididae and Myliobatidinae.

When the ending of *-batis* is changed to *-us* or *-os*, the stem is simply *-bat*. *Rhynchobatus* therefore correctly forms Rhynchobatinae and *Rhinobatos* forms Rhinobatidae, as cited by Nelson.

The generic name *Dasyatis* is an unusual case. Agassiz (1845) supposed it to be an error for *Dasybatis*. Such an error cannot be emended, but it seems reasonable to treat *Dasyatis* as the names in *-batis* in the same Order are treated. Therefore,

(21) Dasyatidae should be Dasyatididae, and

(22) Dasyatinae should be Dasyatidinae.

However, it would be desirable to obtain a ruling from the International Commission on Zoological Nomenclature on this.

Many names in *-is* do not have the *-id-* stem. Names formed from *ophis* 'serpent' are in this category (Greek genitive *opheōs* or *opheos*), although the diminutive is *ophidion*. They should be treated as are Latin words in *-is*, that is, the genitive stem is the same as that of the nominative and the *-is* ending simply deleted when a different suffix is added. The treatment of such words in Appendix D, Table 2B, of the Code should be emended.

(23) Nemophididae should be Nemophidae;

(24) Percophididae should be Percophidae; and

(25) Percophidinae should be Percophinae.

Names formed from *Pristis*, *Pterois*, *Chromis*, *-aclis* (*Pteraclis*), and *-opsis* (*Cetopsis*, *Percopsis*) are also in this latter category and have correctly formed family-group names.

Lampris Retzius, 1799 was stated by Agassiz to be based upon the Greek adjective *lampros*. Inasmuch as *lampris* is not attested in Greek lexicons that word can only be considered as having a changed ending (*-os* replaced by Latin or Greek *-is*). The form of the family cited by Nelson, Lampridae, may be considered correct because of lack of evidence that *Lampris* has the stem *lamprid-*. Furthermore,

(26) Lampridiformes should be Lampriformes, and

(27) Lampridoidei should be Lamproidei.

The name *Chirolophis* is not formed from *ophis*, but from *lophos* 'ridge' with a replaced ending. The tribal name Chirolophini is therefore correct.

The name *Omosudis* is derived from *Sudis*, cited by Agassiz as a proper name. The only *sudis* in classical lexicons is Latin and does have a genitive differing from the nominative. The family named Omosudidae is therefore correct.

Names formed from *actis* have the stem *actin-*. Therefore, the names cited by Nelson, Aploactininae (from *Aploactis*) and Gigantactinidae (from

Gigantactis) are correct, but

(28) Bathyploactinae should be Bathyploactininae.

C. Names in *-as* are also treated variously according to the grammatical properties of the word they end. Nouns (not participles) in *-as* after a consonant (not *-ias*) are feminine and have a stem in *-ad-*. The following, based upon *Bembras* and *Premnas*, should be corrected:

(29) Bembrinae should be Bembradinae, and

(30) Premninae should be Premnadinae.

The name *Doras* Lacepède, 1803 was considered by Agassiz to be derived from Greek *dory*. It is not attested in Greek lexicons but may be considered to belong to the same small class of Greek words which includes the foregoing (*Bembras*, *Premnas*) and such words as *lampas*, *deiras*, and *niphas*. The family name used by Nelson, *Doradidae*, may therefore be considered correct.

Another kind of word ending in *-as* are participles, a kind of verbal adjective used in the capacity of generic names as nouns. Nelson cites *Anabantidae* (from *Anabas*) correctly; it is a participle of the Greek verb *anabainō* 'to go up.' Another generic name in this category is *Anarhichas* Linnaeus; it can only be derived from the Greek verb *anarrhichaomai* 'to clamber up.' Verbs in *-omai* do not have participles in *-as*, but it seems reasonable to consider that Linnaeus intended to form a participle similar to *Anabas*, and to treat it similarly, that is, to use the stem in *-nt-* with it, rather than either *-ad* or *-at-*. For this reason,

(31) *Anarhichadidae* should be *Anarhichantidae*.

Names in *-ias* are masculine and have the stem in *-i-*, in other words, the *-as* ending is deleted when applying other endings. The following names are therefore correct: *Alopiinae*, *Ceratiidae*, *Diceratiidae*, *Clariidae*, *Dalatiinae*, *Eulophiini*, *Galaxiidae*, *Xiphiidae*. The following should be corrected:

(32) *Melanostomiatidae* should be *Melanostomiidae*;

(33) *Oryziatidae* should be *Oryziidae*;

(34) *Stomiatidae* should be *Stomiidae*;

(35) *Stomiatoidae* should be *Stomioidae*; and

(36) *Stomiatoidei* should be *Stomioidei*.

D. Names in *-ma* are usually neuter in gender and have a stem in *-mat-*. They are of Greek origin and end in the letter alpha. There are, however, a few which end in eta in Greek, are feminine in gender, and have a stem in *-m-*. There are even a few cases of verbal nouns formed from the same verb, one ending in alpha and the other ending in eta. Both of such words appear in classical Latin transcription as *-ma*. The word *gramma* is one of these. There was a semantic difference between the two forms, but even the Greeks had trouble applying it, and it seems reasonable for nomenclatural purposes to consider all names ending in *-ma* for which there is a form

in alpha as neuter and to have *-mat-* stems. There are a few, such as *toma*, which have only the form ending eta; these of course should be feminine and have the *-m-* stem. And of course when the word ending in *-ma* is part of a nomenclatural name with a replaced ending, such as *-us*, *-is*, or *-um*, the stem will also be simply *-m-*.

Some frequently used final elements of names are in the neuter *-ma* class, including *-gramma*, *-soma*, *-stoma*, and *-omma*. The following group names in Nelson are correct: Dorosomatinae, Ellassomatinae, Oreosomatidae, Sparisomatinae, Etheostomatini, Gonostomatidae, Gonostomatoidae, Microstomatinae, Moxostomatini.

The following names require correction:

- (37) Cyemidae should be Cyematidae;
- (38) Grammidae should be Grammatidae;
- (39) Pseudogrammidae should be Pseudogrammatidae;
- (40) Ariommidae should be Ariommatidae;
- (41) Dysommidae should be Dysommatidae;
- (42) Dysomminae should be Dysommatinae;
- (43) Glaucosomidae should be Glaucosomatidae;
- (44) Branchiostomidae should be Branchiostomatidae;
- (45) Nettastomidae should be Nettastomatidae.

Because of the replaced endings, Aulostomidae (from *Aulostomus*), Anostomidae (from *Anostomus*), and Solenostomidae (from *Solenostomus*) are correct.

E. Another class of participles are certain words ending in *-on*. These have a long *ō* in Greek, are of masculine gender, and have a stem in *-ont-*. Four names of fishes are formed on *-myzon*, a participle of the verb *myzō* 'to suck.' Two of them have correctly formed family-group names: *Erimyzontini* and *Gastromyzontinae*. The other 2 should be corrected:

- (46) Mayomyzoninae should be Mayomyzontinae;
- (47) Petromyzonidae should be Petromyzontidae;
- (48) Petromyzoninae should be Petromyzontinae; and
- (49) Petromyzoniformes should be Petromyzontiformes.

The case of *Petromyzon* is Case No. Z.N. (S.) 2045 before the International Commission on Zoological Nomenclature. It was published in the *Bulletin of Zoological Nomenclature*, vol. 30, p. 198–199, and I commented on it in the same journal, vol. 32, p. 21.

F. Names in *-odus* are usually from Greek *odous* 'tooth,' are of masculine gender, and have a stem in *-odont-*. The following are correct in Nelson: Chauliodontidae, Chilodontidae, Distichodontidae, Hemiodontinae, Micromischodontinae, Prochilodontidae, Synodontidae. Agassiz stated that his genus *Ceratodus* is derived from *odous*; therefore:

- (50) Ceratodidae should be Ceratodontidae.

Pimelodus Lacepède, 1803 was unjustifiably emended to *Pimelodes* by Duméril in 1805. Agassiz recognized that *Pimelodus* is the Greek word *pimelōdēs* with a replaced ending. The family name Pimelodidae is therefore correct.

G. Names in *-pus* are frequently derived from Greek *pous* 'foot,' are of masculine gender, and have a stem in *-pod-*. The names based upon *Ateleopus* (Ateleopodidae, etc.) are therefore correct. *Lepidopus* is evidently also so derived. Agassiz stated that *Carapus* Rafinesque is also derived from *pous*. Therefore:

- (51) *Lepidopinae* should be *Lepidopodinae*;
- (52) *Carapidae* should be *Carapodidae*; and
- (53) *Carapinae* should be *Carapodinae*.

H. Names formed on the Greek word *gaster* 'abdomen' are feminine, elide *e*, and form a stem *gastr-*, similar to the way *conger* and *scomber* form their stems *congr-* and *scombr-*; therefore:

- (54) *Anoplogasteridae* should be *Anoplogastridae*;
- (55) *Canthogasterinae* should be *Canthogastrinae*;
- (56) *Korsogasteridae* should be *Korsogastridae*;
- (57) *Pristigasterinae* should be *Pristigastrinae*; and
- (58) *Trichogasterinae* should be *Trichogastrinae*.

I. Adverbs as generic names. The generic name *Odax* is a Greek adverb meaning 'by biting with the teeth,' and is therefore strictly speaking not in one of the categories of words available for names of genera. However, if it be considered a neologistic noun by virtue of its use as a generic name, it may be treated as Latin to the extent that it would have a stem similar to those of Latin nouns of similar form, viz., it would have the stem *Odac-*. The family-group name cited in Nelson may therefore be considered proper.

J. Miscellaneous. Two cases of family-group names lacking a letter *i* are based upon *Oxylebius* and *Proscyllium*, which respectively have the stems *Oxylebi-* and *Proscylli-*; therefore:

- (59) *Oxylebinae* should be *Oxylebiinae*, and
- (60) *Proscyllini* should be *Proscylliini*.

Names in *-e* generally drop that letter for their stems, as do *Belone*, *Mene*, *Narcine*, *Narke*, and *Thalassophryne* in forming *Belonidae*, *Menidae*, *Narcininae*, *Narkini*, and *Thalassophryninae*, respectively. There seems to be no reason why the name *Schilbe* should not be treated likewise:

- (61) *Schilbeidae* should be *Schilbidae*.

Names ending in *-es* drop that syllable for their stems; therefore:

- (62) *Helogeneidae* should be *Helogenidae*, and
- (63) *Melamphaeidae* should be *Melamphaidae*.

Bembrops has the stem *Bembrop-*; therefore:

(64) *Bembropsinae* should be *Bembropinae*.

Peronedys must be derived from Greek *pēros* + *nēdys* and have a stem *Peronedy-*; therefore:

(65) *Peronedysidae* should be *Peronedyidae*.

The word used in Latin as *cerdo*, a loanword from Greek *kerdos*, has the stem *cerdon-*; therefore:

(66) *Galeocerdini* should be *Galeocerdonini*.

The generic name *Sillago* Cuvier, 1817 is stated by Agassiz to be derived from the Greek adjective *sillos* 'squint-eyed.' It may therefore be considered to have the Latin formant *-ago* applied to it and to have a stem similar to those of Latin words in *-ago*, such as *farrago*, *imago*, *virago*, viz., *sillagin-*. On this basis the family name *Sillaginidae* is correct.

The genus *Kasidoron* and the family *Kasidoroidae* were proposed by Robins and De Sylva in 1965 without indication of derivation. The name *Kasidoron* is derived from Greek *kasis* + *dōron*, signifying something like 'a gift from a brother.' It is therefore of neuter gender (not originally indicated) and has the stem *Kasidor-*; therefore:

(67) *Kasidoroidae* should be *Kasidoridae*.

In 2 cases diminutives have been treated as if they were participles. The genus name *Ostracion* is a diminutive, of neuter gender, and has the stem *Ostraci*; therefore:

(68) *Ostraciontidae* should be *Ostraciidae*;

(69) *Ostraciontinae* should be *Ostraciinae*; and

(70) *Ostraciontoidae* should be *Ostracioidae*.

The other diminutive is *Zenion* Jordan and Evermann. The authors stated that it is a diminutive of *Zeus*; as such, it will have the stem *Zeni-*. Therefore:

(71) *Zeniontinae* should be *Zeniinae*.

Inasmuch as the generic name *Capros* is simply the Greek word for 'goat' and has the stem *capr-*, Jordan and Evermann, and Gill before them, recognized that *Capridae* would conflict with family-group names for goats and used the form *Caproidae*. Nelson's citation of that form, as well as *Caprinae*, is therefore justified; however, the usage should be legalized by submission of an application to the Commission. The goats at present constitute a subfamily *Caprinae*.

Two spellings of a name, *Noemacheilus* and *Nemacheilus*, are noted in Zoological Record as published by the same author in the same year. Whatever is the valid original spelling of the genus, the family-group name based upon it will be formed upon that name as far as the 'l' followed by the appropriate family-group suffix. Nelson uses *Noemacheilinae*.

Index to Basonyms

If a name is discussed, reference is given to the Case number in parentheses; otherwise the closest following Case number is given, except for 3 names in the final paragraphs, which are referred to by "(final)."

Acanthobatis (17); *Alopias* (32); *Anabas* (31); *Anarhichas* (31); *Anoplogaster* (54); *Aploactis* (28); *Arhynchobatis* (18); *Ariomma* (40); *Ateleopus* (51); *Aulostomus* (46); *Bathyaploactis* (28); *Batis* (19); *Belone* (61); *Bembras* (29); *Bembrops* (64); *Branchiostoma* (44); *Canthogaster* (55); *Capros* (final); *Carapus* (52), (53); *Centris* (11); *Ceratias* (32); *Ceratodus* (50); *Cetopsis* (26); *Chauliodus* (50); *Chilodus* (50); *Chirolophis* (28); *Chromis* (26); *Clarias* (31); *Cobitis* (2), (3); *Conger* (54); *Cranoglanis* (15); *Cyema* (37); *Dalatias* (31); *Dasyatis* (22); *Derichthys* (1); *Diceratias* (31); *Distichodus* (50); *Doras* (31); *Dorosoma* (37); *Dysomma* (41), (42); *Echeneis* (4); *Elassoma* (37); *Eleotris* (5); *Engraulis* (6); *Erimyzon* (46); *Etheostoma* (37); *Ephippis* (7); *Eulophias* (31); *Galaxias* (31); *Galeocerdo* (66); *Gastromyzon* (46); *Gigantactis* (28); *Glaucosoma* (43); *Gonostoma* (37); *Gramma* (38); *Grammicolepis* (15); *Helogenes* (62); *Hemiodus* (50); *Heterotis* (8); *Kasidoron* (67); *Korsogaster* (56); *Lampris* (26), (27); *Latris* (9); *Lepidopus* (51); *Liparis* (10); *Mayomyzon* (46); *Melamphaes* (63); *Melanostomias* (32); *Mene* (61); *Microcentris* (11); *Micromischodus* (50); *Microstoma* (37); *Moxostoma* (37); *Muraenolepis* (15); *Myliobatis* (20); *Narcine* (61); *Narke* (61); *Nemacheilus* (final); *Nemichthys* (1); *Nemophis* (23); *Nettastoma* (45); *Noemacheilus* (final); *Odax* (59); *Omosudis* (28); *Ophichthus* (1); *Oreosoma* (37); *Oryzias* (33); *Ostracion* (68) to (70); *Oxylebius* (59); *Paralepis* (15); *Pempheris* (12); *Percophis* (24), (25); *Peropsis* (26); *Peronedys* (65); *Petromyzon* (47) to (49); *Pholis* (13); *Pimelodus* (51); *Premnas* (30); *Pristigaster* (57); *Pristis* (26); *Pristolepis* (16); *Prochilodus* (50); *Proscyllium* (60); *Pseudogramma* (39); *Pteraclis* (26); *Pteroidichthys*, -tys (2); *Pterois* (26); *Rhynchobatus* (21); *Schilbe* (61); *Scomber* (54); *Scorpiis* (14); *Sillago* (67); *Solenostomus* (46); *Stomias* (34) to (36); *Synodus* (50); *Thalassophryne* (61); *Trichogaster* (58); *Xiphias* (31); *Zaniolepis* (5); *Zenion* (71).

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Literature Cited

Agassiz, L. 1845. *Nomenclator Zoologicus*. Fasc. VII/VIII.—Soloduri (Solthurn), Jent & Gassmann. vi, 69, 5 pages.

Hubbs, C. L. 1978. (Review of) *Fishes of the World*, etc.—*Systematic Zoology* 27(1):136–137.

Nelson, J. S. 1976. *Fishes of the World*.—John Wiley & Sons, New York, etc. xiii, 416 pages.

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Steyskal, George C. 1980. "The grammar of family-group names as exemplified by those of fishes." *Proceedings of the Biological Society of Washington* 93, 168–177.

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