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ARTICLE VI.

An Outline of an Attempt at the Disposition of Mammalia into Tribes and Families, with a List of the Genera apparently appertaining to each Tribe. By J. E. Gray, Esq. FGS. &c.

(To the Editors of the *Annals of Philosophy*.)

GENTLEMEN,

British Museum.

ALTHOUGH popular curiosity is almost exclusively confined to the study of the manners of this class of animals; an eminent zoologist has observed, that notwithstanding the anatomy of the Mammalia has had infinitely more attention paid to it than that of all the rest of the organized creation put together, it is not too much to say that their natural arrangement is as little or even less known than that of any other part of zoology.

Indeed Illiger and Cuvier are the only zoologists, since the time of Linnæus, who have paid attention to the classification of Mammalia. The arrangement of the former is professedly artificial, and of that of the latter, the above quoted zoologist has observed, that no where at least do we find inconsistencies so conspicuous as in the following order (quoting that of Cuvier), which is that nevertheless of the most learned comparative anatomist in existence.

I have found the orders of Linnæus, which are merely a paraphrase of those proposed by Ray, to be exceedingly natural, and several of my families have been established as orders and genera by Cuvier and others. In the following sketch, the disposition is more novel than the families themselves, except in the order *Glares*, where I have attempted (but not very successfully I am afraid), to re-model them entirely, and to divide them according to their general habits. In so doing I placed the genera together, in what I considered natural tribes, and then threw them into what appeared to be natural groups, and have attempted to find out some character common to the tribes by which these groups might be distinguished; but much more is wanting to be known respecting the genera of this order.

I have added to each of the tribes a list of the published genera, which have come to my knowledge, with the name of the original describer.*

§ 1. *Teeth of the three distinct sorts, and forming a continuous series.*

Order I.—PRIMATES, *Lin.*

The anterior, and the hinder extremity, with a distinct and

* The Mammalia at present in the Museum amounting to about 200 species, are disposed, as far as is consistent with their being well seen in the present confined space, according to the following arrangement.

opposite thumb; claws flat, small; grinders uniform, tubercular; condyle of the jaws round; orbital and temporal fossæ distinct; penis free, pendulous; teats pectoral.

* *Anthropomorphous.*

Fam. 1. HOMINIDÆ.

Cutting teeth four above and below; grinders 5-5 above and below; nostrils separated by a narrow septum.

†Tail none. 1. *Hominina*, Homo. 2. *Simiina*. Troglodytes, Geoff. Simia, Lin. Hylobates, Illiger. ††Tail long or short. 3. *Presbytina*. Presbytes, Eschy. 4. *Cercopithecina*. Lasiopyga, Illig. Cercopithecus, Lin. Cercocebus, Geoff. Macacus. 5. *Cynocephalina*. Cynocephalus, Brisson. Papio, Brisson.

Fam. 2. SARIGUIDÆ.

Grinders 5-5 in each jaw, acutely tubercular, or 6-6 bluntly tubercular; nostrils separated by a broad space; tail long. *South America.*

†Tail end naked. 1. *Mycetina*. Mycetes, Illig. 2. *Atelina*. Ateles, Geoff. Brachyteles, Spix. Gastromargus, Spix. Lagothrix, Geoff. ††Tail end hairy. 3. *Callithricina*. Cebus, Erzl. 4. *Saguinina*. Saguinus, Lacep. Nyctipithecus, Spix. Pithecia, Geoff. Brachypus, Spix. 5. *Harpalina*. Jacchus, Geoff. Midas, Geoff.

** *Quadrupedoid.*

Fam. 3. LEMURIDÆ.

Grinders 6-6 above, 5-5 below; nostrils terminal; extremities free; first finger of the hind feet armed with recurved claws.

†Head long; grinders blunt. 1. *Lemurina*. Lemur, Lin. 2. *Lichanotina*. Indris, Lacep. Lichanotis, Illig. ††Head round. 3. *Loridina*. Loris, Geoff. Nyaticebus, Geoff. 4. *Galagonina*; Otoliemus, Illig. Galago, Adams. Cheirogallus, Geoff. 5. *Tarsina*, Tarsius. 6. *Cheiromina*. Cheiromys, Cuv.

Fam. 4. GALEOPITHECIDÆ.

Grinders 6-6 above, 5-5 below, acutely tubercular; extremities and tail enveloped in a hairy skin; finger short.

Galeopithecus, Pallas.

Fam. 5. VESPERTILIONIDÆ.

Grinders various, true 3-3 in each jaw; tail, limbs, and fingers, inclosed in thin, naked membranes, fingers very long, stretching the membrane.

†Nose leaved. 1. *Rhinolophina*. Megaderma, Geoff. Rhinolophus, Geoff. Nycteris, Geoff. Mormoops, Leach. Nyctophilus, Leach. 2. *Phyllostomina*. Phyllostomus, Geoff. Vampyrus, Geoff. Arctibeus, Medateus, and Monophylus, Leach. Diphylla, Spix. Rhinopoma and Glossophaga, Geoff. ††Nose leafless. 3. *Pteropina*. Pteropus, Geoff. Cynopterus and

Macroglossum, *F. Cuv.* Cephalotis, *Geoff.* Harpyia, *Illig.*
 4. *Noctilionina.* Noctilio, *Lin.* Stenoderma and Nyctinomus,
Geoff. Dysopes and Molossus, *F. Cuv.* 5. *Vespertilionina.* Vespertilio and Plecotus, *Geoff.* Barbastellus, *Gray.* Proboscidea and Thyroptera, *Spir.* Cælano, *Leach.*

Order II.—FERÆ, *Lin.*

Thumb of the fore extremities not opposite; toes clawed; teats ventral; penis sheathed.

*Cutting teeth six above and below; grinders of three sorts.

Fam. 1. FELIDÆ.

Toes only applied to the ground in walking. Nose scarcely mobile, rounded.

†No tubercular grinders in the lower jaws. 1. *Hyæna.* Hyæna, *Brisson.* Proteles, *Geoff.* 2. *Felina.* Felis, *Lin.* Lynx, *Gray.* Prionodon, *Horsf.* ††Tubercular grinders in both jaws. 3. *Mustelina.* Putorius, Zorilla, and Mephitis, *Cuv.* Mustela, *Lin.* Lutra, *Ray.* 4. *Viverrina.* Viverra, *Lin.* Genetta, *Cuv.* Herpestes, *Illig.* Crossarchus, *F. Cuv.* Suricata, *Desm.* Paradoxurus, *F. Cuv.* Ictides, *Valenc.* 5. *Canina.* Canis, *Lin.* Fennecus, *Desm.* Lycaon, *Brookes.*

Fam. 2. URSIDÆ.

The soles of the feet bald, cartilaginous, applied to the ground in walking; toes 5-5 often armed with long claws; nose mobile, often used in digging.

†Tubercular grinders, 2-2 above, and 2-2 or 1-1 below. 1. *Ursina.* Ursus, *Lin.* Danis, *Gray.* Prochilus, *Illig.* Helarctos, *Horsf.* Thalassarctos, *Gray.* 2. *Procyonina.* Procyon and Nasua, *Storr.* ?Potos, *Geoff.* ††Tubercular grinders 1-1 above and below. 3. *Gulonina.* Gulo, *Retz.* Galera, *Brown.* Grisonia, *Gray.* Mellivora, *Storr.* 4. *Myadina.* Myadus, *F. Cuv.* 5. *Taxina.* Meles, *Brisson.*

**Cutting teeth various (rarely six above and below); grinders of two sorts, false and tubercular.

Fam. 3. TALPIDÆ.

Cutting teeth distinct; grinders acutely tubercular; legs short for walking or digging; no nursing pouch nor marsupial bones. Allied to *Vespertilionidæ.*

*Fore feet fit for digging. 1. *Talpina.* Talpa, *Lin.* 2. *Chrysochlorina.* Condylura, *Illiger.* Chrysochloris and Scalops, *Cuv.* ††Fore feet for walking. 3. *Soricina.* Sorex, *Lin.* Mygale, *Cuv.* 4. *Erinacina.* Erinaceus, *Lin.* 5. *Tenrecina.* Tenrecus, *Lecep.* 6. *Tupaia.* Tupaia, *Raffles.*

Fam. 4. DIDELPHIDÆ.

Cutting teeth distinct; canine sometimes wanting; grinders acutely tubercular; thumb of hind feet mostly distinct, clawless; nursing pouch and marsupial bones distinct.

†Cutting teeth six above, two below. 1. *Macropina*. *Macropus*, Shaw. *Halmaturus*, Illiger. *Potorous*, Desm. 2. *Phalungistina*, *Acrobata*, Desm. *Petaurus*, F. Cuv. *Phalangista* and *Balantia*, Illiger? *Phascalaretus*, Blainv. ††Cutting teeth not six above, and two below. 3. *Phascolumina*. *Phascolumys*, Illiger. 4. *Didelphina*. *Didelphis*, Lin. *Cheironectes*, Illiger. 5. *Dasyurina*. *Peracyon*, Gray. *Dasyurus*, Illiger. *Phascogale*, Tem. 6. *Peramelina*. *Perameles* and *Isodon*, Geoff.

Fam. 5. PHOCIDÆ.

Cutting teeth six or four above, four or two below; canine teeth distinct; grinders tubercular, or truncated; limbs short, fin-shaped, hinder ones horizontal; nostrils operculated.

†Grinders many rooted; ears none; nose simple. 1. *Stenorhyncina*. *Pelagios*, F. Cuv. *Stenorhyncus*, F. Cuv. 2. *Phocina*. *Phoca*. ††(Grinders roots simple, or divided, and with ears distinct.) 3. *Enhydrina*. *Enhydra*, Flem. 4. *Otarina*. *Otaria*, Peron. *Platyrhynchus*, F. Cuv. 5. *Stemmotopina*. *Stemmotopus* and *Macrorhinus*, F. Cuv.

§ 2. Teeth not of three sorts, or not forming a continuous series.

Order III.—CETÆ, Lin.

Teeth none, or all similar, conical; body, fish-shaped, nearly bald; limbs fin-shaped, hinder sometimes forming a horizontal tail.

*Skin smooth, without any hair or whiskers.

Fam. 1. BALÆNIDÆ.

Head very large, one-third the length of the body. 1. *Balænina*. *Balæna*, Willoughby. *Balænoptera*, Lacep. 2. *Physeterina*. *Physalus*, Lacep. *Physeter*, Lin. *Catodon*, Ljv.)

Fam. 2. DELPHINIDÆ.

Head small or moderate; body long; blowers united. 1. *Delphinina*. *Delphinus*, Lin. *Delphinorhynchus*, Blainv. 2. *Phocanina*. *Phocæna*, Cuv. *Delphinapterus*, Lacep. *Heterodon*, Blainv. *Monodon*, Lin.

**Skin rather hairy, whiskers distinct; grinders flat topped.

Fam. 3. TRICHECHIDÆ.

Body oblong; hind feet, rather prominent, clawed; tail short, separate; canine upper, very long exerted.

Trichecus, Lin.

Fam. 4. MANATIDÆ.

Manatus, Cuv.

Fam. 5. HALICORIDÆ.

Halicora, *Illiger?* Stellerus, *Cuv.*

Order IV.—GLIRES, *Lin.*

Teeth, cutting, two in each jaw, large, strong, separated from the grinders by a space; canine teeth none; condyles of the jaws longitudinal; orbital and temporal fossæ united; toes distinct, with small conical claws; thumb sometimes rudimentary.

[Exceedingly difficult to arrange: the following is only an attempt according to their habits.]

*Fur with scattered larger hairs or spines; tail spiny or scaly.

Fam. 1. MURIDÆ.

Cutting teeth two in each jaw, lower, awl-shaped; grinders simple or compound, upper shelving backward, lower forwards; limbs proportionate; tail scaly; fur with scattered longer hairs, or flat spines; clavicles distinct.

†Grinders rooted, simple. 1. *Murina*. Mus, *Lin.* Otomys, *F. Cuv.* Capromys, *Desm.* 2. *Hydromina*. Hydromys, *Geoff.*

††Grinders rootless, compound. 3. *Ondatrina*. Ondatra. 4. *Castorina*. Castor, *Lin.* Osteopera, *Harlan.* 5. *Echymina*. Echymys, *Geoff.* Heteromys, *Desm.* Saccomys, *F. Cuv.*

Fam. 2. HISTRICIDÆ.

Cutting teeth two in each jaw, lower, truncated; grinders 4-4 in each jaw, rooted, compound; tongue and body covered with spines; clavicles none.

†Tail short. 1. *Histrix*, *Lin.* 2. *Acanthia*. ††Tail elongated. 3. *Erythizon*. 4. *Spygurus*. 5. *Simthurus*, *F. Cuv.*

**Fur nearly equally soft; tail none, or hairy.

Fam. 3. LEPORIDÆ.

Cutting teeth two in each jaw, or four in the upper one, lower one subsubulate; grinders numerous, rootless; ears generally large; tongue often hairy; eyes large; clavicles none; fore feet short; hinder ones long; tail none, or very short, hairy; fur soft.

†Cutting teeth four above. 1. *Leporina*. Lepus? *Lagomina*. Lagomys. ††Cutting teeth two above. 3. *Caviina*, *Cavia*, *Lin.* Kerodon, *F. Cuv.* 4. *Hydrocharina*. Hydrocharus, *Brisson.* 5. *Dasy porcina*. Cælogenys, *Illig.* Dasyporca, *Illig.* Dolichotis, *Desm.*

Fam. 4. IERBOIDÆ.

Cutting teeth two in each jaw; grinders simple, or compound, rooted; ears moderate; eyes large, prominent; clavicles distinct; fore feet short (used as hands); hind feet very long; tail long, hairy, used in leaping or walking; fur soft.

†Grinders compound or rootless. 1. *Pedestina*. *Pedestes*, *Illig.* 2. *Dipina*. *Dipus*, *Schreb.* *Meriones*, *F. Cuv.* not *Illiger.*
 ††Grinders simple, roots divided; legs nearly equal. 3. *Gerbilina*. *Gerbillus*, *Desm.* 4. *Myoxina*. *Myoxus*, *Gmelin.*
 5. *Sciurina*. *Sciuropterus*, *F. Cuv.* *Pteromys*, *Cuv.* *Macroxus*, *F. Cuv.* *Sciurus*, *Lin.* *Tamias*, *Illiger.* The latter genus is very closely allied to *Arctomina*.

Fam. 5. ASPALACIDÆ.

Cutting teeth two in each jaw, lower chisel, or awl-shaped, often very much exposed; grinders compound or simple, rarely rootless; ears and eyes often very small, sometimes hid; clavicles strong; limbs proportionate; tail none, or hairy, cylindrical; fur very soft.

†1. *Aspalacina*. *Orycterus*, *F. Cuv.* *Bathyergus*, *Illiger.* *Aspalax*, *Oliv.* 2. *Lemnina*. *Arvicola*, *Lacep.* *Sigmodon*, *Say.* *Neotoma*, *Say.* *Lemnus*, *Lin.* ††3. *Cricetina*. *Cricetus*, *Lacep.* 4. *Pseudotomina*. *Pseudotoma*, *Say.* *Diplostoma* and *Geomys*, *Raff.* 5. *Arctomina*. *Arctomys*, *Gmel.* *Spermophilus*, *F. Cuv.*

Order V.—UNGULATA, *Ray.* *Bruta*, *Pecora*, and *Bellus*, *Lin.*

Teeth irregular; cutting and canine teeth often wanting in one or both jaws; grinders all similar, sometimes wanting; toes large, covered with hoofs or large conical claws,

*Two middle toes large, equal; bones of the metacarpus and metatarsus united.

Fam. 1. BOVIDÆ.

Two middle toes separate; cutting teeth eight below; upper jaw callous; grinders 6-6 in each jaw; frontal bones with horns; gullet with two large pouches just before the stomach, used for holding and soaking the food before it is chewed; using their head and horns in defence.

†Horns persistent. 1. *Bovina*. *Bos*, *Lin.* *Ovis*, *Lin.* *Capra*, *Lin.* *Antilocapra*, *Ord.* *Antilope*, *Brisson.* *Catoblepas*, *Gray, Med. Rep.* The nostrils of this genus are very peculiar, being very large, and exactly covered with a moveable lid. 2. *Camelopardina*. *Camelopardalis*, *Lin.*

††Horns none, or deciduous. 3. *Camelina*. *Camelus*, *Lin.* *Auchenia*, *Illiger.* 4. *Moschina*. *Moschus*, *Lin.* *Memina*, *Gray, M. R.* 5. *Cervina*. *Muntjaccus*, *Gray.* *Coassus* and *Capreolus*, *Gesner.* *Axis*, *Blainv.* *Cervus*, *Lin.* *Dama*, *Gesner.* *Tarandus*, *Pliny.* *Alus*, *Pliny.*

Fam. 2. EQUIDÆ.

Two middle toes soldered in one; cutting teeth six in each jaw; canine teeth one in each jaw; gullet and stomach simple; using the hind feet in defence.

Equus, *Lin.* *Asinus*, *Gray.*

**Toes 3, 4, or 5, to each foot, nearly equal; teeth nearly in one series.

Fam. 3. ELEPHANTIDÆ.

Grinders rooted, transversely ridged; toes 3-3, 3-4, or 5-5; last joint covered with a hoof; skin thick, nearly naked; hairs large, ridged; gullet simple.

†Nose extended into a trunk. 1. *Elephantina*. *Elephas*, *Lin.* *Mastodon*, *Cuv.* 2. *Tapirina*. *Tapirus*, *Briss.* *Lophiodon* and *Paleotherium*, *Cuv.* ††Nose not produced into a trunk. 3. *Rhinocerina*. *Rhinoceros*, *Lin.* *Hyrax*, *Herman.* (allied to *Caviina*.) *Lipura* and *Elasmotherium*, *Fischer.*? *Anoplotherium*, *Xyphodon*, *Dolichotuna*, *Adapis*, *Anthacotherium* and *Chæropotamus*, *Cuv.* (all very much allied to *Suina*). 4. *Suina*. *Sus*, *Lin.* *Babiroussa*, *Phascochærus*, *F. Cuv.* *Dicotyles*, *Cuv.* 5. *Hippopotamina*. *Hippopotamus*, *Lin.* (allied to *Halicoridae*?)

Fam. 4. DASYPIDÆ.

Grinders rootless, crown flat, sometimes entirely wanting; face long, acute; mouth mostly very small; body armed with scales or ridged hairs.

†Body covered with scales and armour, revolute. 1. *Manina*. *Manis*, *Lin.* 2. *Dasygina*. *Tylopeutes*, *Illiger.* *Priodon*, *F. Cuv.* not *Horsf.* *Dasypus*, *Lin.* *Chlamyphorus*, *Harlan.* ††Body hairy or spinous, not convolute. 3. *Orycteropina*. *Orycteropus*, *Geoff.* 4. *Myrmecophagina*. *Myrmecophagus*, *Lin.* *Tamandua*, *Gray*, *M. R.* *Cyclothurus*, *Gray.* 5. *Ornithoryncina*. *Echidna*, *Cuv.* *Ornithoryncus*, *Blum.*

Fam. 5. BRADYPIDÆ.

Grinders rootless, cylindrical; crown, when young, conical; tail round; neck short; limbs very long; teats pectoral; hair, dry, crisp; stomach two or three celled (allied to *Loridae* in habits).

Bradypus, *Lin.* *Cholæpus*, *Illiger.* *Megatherium*, *Cuv.* *Megalonix*, *Jefferson.*

I have placed *Glires* between *Cetæ* and *Ungulata* that the orders of mammalia and birds should be parallel in analogy; and also because both orders have apparently a nearly equal affinity to the Primates by the genera *Bradypus* in one, and *Cheiomys* in the other; but the affinity of *Hippopotamus* to some of the *Cetæ* is much more apparent than any affinity that I am able to discover between any of the *Glires* and the latter. The *Glires* and the *Ungulata* are allied by means of the genera *Hydrocharus* and *Hyrax*.

The following series will exhibit the manner in which the orders appear to be connected together:—

- Order I.—PRIMATES.**
- | | |
|------------------------|--------------------------|
| <i>Typical Groups.</i> | <i>Annectant Groups.</i> |
| 1. Hominidæ. | 3. Lemnidae. |
| 2. Sariguidæ. | 4. Galeopithecidae. |
| | 5. Vespertilionidae. |

- Order II.—FERÆ.**
- | | |
|------------------------|----------------|
| <i>Fam. 1. Felidæ.</i> | 3. Talpidæ. |
| 2. Ursidæ. | 4. Didelphidæ. |
| | 5. Phocidæ. |

- Order III.—CETÆ.**
- | | |
|--------------------------|--------------------------|
| <i>Typical Groups.</i> | <i>Annectant Groups.</i> |
| <i>Fam. 1. Balænidæ.</i> | 5. Trichechidæ. |
| 2. Delphinidæ. | 4.? Manatidæ. |
| | 5.? Halicoridæ. |

- Order IV.—GLIRES.**
- | | |
|------------|-------------|
| Histicidæ. | Leporidæ. |
| Muridæ. | Ierboidæ. |
| | Aspalacidæ. |

I am uncertain which are the typical families of this order.

- Order V.—UNGULATA.**
- | | |
|------------------------|-----------------|
| <i>Fam. 1. Bovidæ.</i> | 3. Elephantidæ. |
| 2. Equidæ. | 4. Dasypidæ. |
| | 5. Bradypidæ. |

ARTICLE VII.

On the Influence of Solar Light on the Process of Combustion.

By Thomas M'Keever, MD.

(To the Editors of the *Annals of Philosophy*.)

GENTLEMEN,

THERE is an opinion prevalent in this, and I have reason to believe in other countries, that the sun's rays, or even the ordinary light of day, when admitted freely into an apartment in which a common fire is burning, have the power either of dulling it considerably, or should the combustion be going on languidly, of altogether effecting its extinction. Hence it is a common