dent Van Hise that college presidents should be entrusted with the power of appointment and removal because they invariably use it in the interests of efficiency and justice, it is possible to believe so for other reasons. In the first place, if the president makes the appointments responsibility can be brought home to an individual; whereas, if the faculty made them, it would be distributed among a body of men, and individuals could evade it. Then the president ought to be better able to perceive the needs of the whole institution than the faculty; for the views of faculty members are sure to be narrowed by an inevitable tendency to give undue importance to their own and allied subjects. A still more important reason for the president's making the appointments, however, is the fact that he is not like members of the faculty influenced by a fear of competition. It is natural that professors on whom the task of recommending appointments falls should prefer docile mediocrity to men of ability sufficient to develop into rivals for the positions they hold. Intellectual men are proverbially jealous, and the keenness with which they scent rivalry is remarkable; so it is not to be wondered at that promising men find the gateway to teaching closely guarded against their entrance, and that those who succeed in slipping by soon find their path so obstructed that many of them retire in disgust. This is something for the president to correct. His penetration should be sufficient to detect this practise; his courage, decision and dignity sufficient to suppress it and to replace it by a spirit of earnest emulation between teachers of the same as well as different subjects. Unfortunately college presidents do not seem now to be selected because they possess inspiring moral and intellectual qualities, but, one is often tempted to believe, because they can clothe popular fallacies and meaningless commonplaces in language of seeming profundity, or because they are skilful in a sort of emasculated machiavellism. When the public learns to take its responsibilities to education more seriously, we shall have college governing boards and college presidents who discharge their duties more intelligently, and this in turn will ensure faculties of higher effectiveness; so that the whole machinery will acquire a nicety of adjustment that will enable its various parts to work together without the friction that takes place between them now.

It would seem, then, that President Van Hise is right in saying that the present machinery of education needs no external modifications, but it is impossible to accept his implication that educational results are satisfactory. As a matter of fact, present results are very poor, not only in the matter of appointments and removals, but in a general way as well. The only way to improve them, however, is to render the real guiding power of education—public opinion—more intelligent.

Sidney Gunn

Massachusetts Institute of Technology,
March 3, 1911

SCIENTIFIC BOOKS

A NEW TRANSLATION OF ARISTOTLE'S "HISTORY OF ANIMALS"[1]

"The History of Animals," by Aristotle, much as it is referred to by naturalists as well as others, has never appeared until lately in a fitting English dress. At last a translation has been published from the pen of a scholar who combines, to an eminent degree, the principal qualifications necessary for such an undertaking—an adequate knowledge of the Greek language and acquaintance with the Grecian fauna. D'Arcy Wentworth Thompson, professor of natural history in University College, Dundee, is the man to whom we are indebted for the new work. It "has been compiled at various times and at long intervals during very many years" and was so long delayed that we had almost despaired of see-

[1] The works of Aristotle translated into English under the editorship of J. A. Smith, M.A. [etc.], and W. D. Ross, M.A. [etc.], Vol. IV., Historia Animalium by D'Arcy Wentworth Thompson, Oxford, at the Clarendon Press, 1910. 8vo, pp. xv + 486[a]–633[a] + 151.—$3.40.

ing it in print, but we are glad at length to welcome its appearance.

I

Besides various abortive attempts and fragmentary translations, two completed English versions of the "History of Animals" had been published, one in 1809 by Thomas Taylor and another in 1862 by Richard Creswell. Both works evince not only an inadequate knowledge of Greek, but an extremely imperfect acquaintance with zoology and consequently would very frequently mislead the reader. The following extracts from the three translations will serve to give an idea of the characteristics of the several versions and might be paralleled to an indefinite extent:

APES, etc.

Taylor, p. 48 (II., viii., ix.).

Some animals however have an ambiguous nature, because they partly imitate man and partly quadrupeds, such as apes, the cœbi [a kind of apes] and the cynocephali. But the cœbus has the tail of an ape; and the cynocephali have the same form with apes, except that they are larger and stronger, and they have a more canine face. Their manners also are more savage, and they have teeth more canine and strong.

Creswell, p. 32 (II., v., 1).

Some animals unite in their nature the characteristics of man and quadrupeds, as apes, monkeys and cynocephali. The monkey is an ape with a tail; cynocephali have the same form as apes, but are larger and stronger, and their faces are more like dogs' faces; they are naturally fierce, and their teeth are more like dogs' teeth, and stronger than in other genera.

Thompson, 502[a], lines 16–22.

Some animals share the properties of man and the quadrupeds, as the ape, the monkey and the baboon. The monkey is a tailed ape. The baboon resembles the ape in form, only that it is bigger and stronger, more like a dog in face, and is more savage in its habits, and its teeth are more dog-like and more powerful.

These are versions of the following Greek original copied from Bekker's edition:

Ἔνια δὲ τῶν ζώων ἐπαμφοτερίζει τὴν φύσιν τῷ τ' ἀνθρώπῳ καὶ τοῖς τετράποσιν, οἷον πίθηκοι καὶ κῆβοι καὶ κυνοκέφαλοι. Ἔστι δ' ὁ μὲν κῆβος πίθηκος ἔχων οὐράν. Καὶ οἱ κυνοκέφαλοι δὲ τὴν αὐτὴν ἔχουσι μορφὴν τοῖς πιθήκοις, πλὴν μείζονές τ' εἰσὶ καὶ ἰσχυρότεροι καὶ τὰ πρόσωπα ἔχοντες κυνοειδέστερα, ἔτι δ' ἀγριώτερά τε τὰ ἤθη καὶ τοὺς ὀδόντας ἔχουσι κυνοειδεστέρους καὶ ἰσχυροτέρους.

A comparison of the several versions with the original shows that Taylor's is quite unreliable, Creswell's is the most literal, and Thompson's correct, free and the most idiomatic from an English point of view.

Taylor has corrupted the word kebos into cœbus, for which there is no justification, and has reversed what Aristotle said as to kebos, the original author declaring that it is a pithekos with a tail.

Creswell's chief fault, in this paragraph, is the omission of the English equivalent for "cynocephali"—baboons; the last four words are uncalled for.

Thompson's is pervaded with a full knowledge of what Aristotle said. He has preferred to change the number in several cases, giving the singular instead of the plural. His use of the word ape (instead of macaque), in common with his predecessors, may mislead many, inasmuch as ape is now so generally restricted to the large, tailless simiids (chimpanzee, gorilla, etc.) that they are involuntarily brought to the mind, to the exclusion of others, by the word. Nevertheless, Professor Thompson may claim perfect justification in the fact that the word originally included the monkeys and that the macaques are still popularly known as apes, the northernmost and typical species being especially called Barbary ape. Some might also prefer to express Aristotle's meaning by a phrase like "Some animals combine in their shape characteristics of man and quadrupeds."

One more example (descriptive of the Greek catfish glanis) will illustrate other weaknesses of the older translators. Book VIII. of the "History" is under consideration.

THE GLANIS

Taylor, 325 (VIII., xx.).

. . . the glanis, in consequence of swimming on the surface of the water, is injured by the deadly influence of the dog-star, and is laid asleep by very loud thunder. Sometimes, likewise, the carp is affected in this manner, but in a less degree.

But the glanis perishes when struck in shallow water by the serpent called a dragon.
Creswell, p. 219 (VIII., xx., 12).

. . . the glanis, from its swimming near the surface, appears to be star-struck by the dog-star, and it is stupefied by loud thunder. The carp suffers in the same way, but not so severely. The glanis, in shallow water, is often destroyed by the dragon-serpent.
Thompson, 602[b], lines 22–26.

For instance, the sheat-fish just before the rising of the Dog-star, owing to its swimming near the surface of the water, is liable to sunstroke, and is paralysed by a loud peal of thunder. The carp is subject to the same eventualities, but in a lesser degree. The sheat-fish is destroyed in great quantities in shallow waters by the serpent called the dragon.

Taylor and Creswell both attribute remarkable offensive powers to the dog-star instead of considering the reference to it as an index of season.[2] The notice about the dragon serpent gives an undue air of mystery and weirdness.[3] A water snake may seize a catfish as well as other fishes, but sometimes with a fatal result. (The present writer, on one occasion on the shore of the Potomac River near Washington, found a large water snake (*Natrix sipedon*) dead with a catfish's trunk in its mouth but the head outside and the pectoral spines immovably outstretched, one piercing the snake's skin behind the corner of the mouth and the other outside.)

Professor Thompson has chosen to use the name sheat-fish as an equivalent of glanis. That name has been in limited use for several centuries as the designation of the *Silurus glanis* of Europe and has given trouble to lexicographers. For example, in the "Century Dictionary," it is derived "appar. < sheat[2], a shote, + fish."[4] It was given by Willughby, in 1686, as the English synonym of the German Shaid or Schaid. Schaidfisch is an equivalent in northern Switzerland (round Lake Constance or Bodensee) for the same species and doubtless sheat-fish has been derived from that name. The English form, to a very limited extent (as by Arthur Adams in 1854), has been used in a wider sense. Inasmuch, however, as glanis is a well-known specific name and the fish so called by Aristotle is quite a different species from the true sheatfish, adherence to the practise of his predecessors in retaining glanis would be deemed desirable by many.

II

Aristotle has been frequently and recently called "the founder of systematic zoology." A very distinguished anatomist (Richard Owen) even claimed that "the Zootoka of Aristotle included the same outwardly diverse but organically similar beings as constitute the Mammalia of modern naturalists." All such claims are baseless. In view of the frequency with which they and the like are repeated, however, explanation of the scope of Aristotle's work is in place.

A striking example of Aristotle's failure to understand principles of natural classification, and fundamental characteristics of animal groups, is exemplified by his treatment of the group of Selachians. This, as now accepted, is a very natural division to which class rank has been assigned by some of the best modern naturalists, but Aristotle has ranked with them the angler or fishing frog (*Lophius*) which is only a slightly modified acanthopterygian fish; he did this merely because it was a flat flabby fish and he approximated it to the torpedo because that also was flat and flabby. The fact that he repeatedly asso-

[2] The dog-star has been long used as a denominator of time. For example, Linnæus in 1741, in his autobiographical sketch, records that in the dog-days he reached Rouen, on his way to Stockholm, which he reached in September.

[3] The "dragon" of the History of Animals was apparently nothing more than an ordinary snake to which extraordinary habits were attributed by popular belief.

[4] *Sheat*[2] is defined "The Shad. Wright. [Prov. Eng.]," *Shote*[1] "same as Shot[3]," the trout or grayling, and *Shote*[2] "a young hog; a pig" and "a thriftless, worthless fellow." In the old editions of the great "Greek-English Lexicon" by Liddell, Scott and Drisler, *glanis* is defined "a kind of *Shad.*" The glanis belongs to a widely distinct order from the shad and trout and is not at all like them.

ciated the angler with the rays precludes the idea that the error originated with an editor or copyist. Many other cases of misplacement of animals, on account of superficial similarity, which differ fundamentally, might be cited did our limits permit. It need only be repeated that Aristotle was not "the founder of systematic zoology" and had little or no appreciation of what is now so termed.

The "History of Animals," indeed, is by no means a treatise on systematic zoology, but rather a work on physiology. It generally includes nine "books," but a tenth was formerly recognized which is now universally regarded as spurious. In general terms, in the first three the parts and regions of "blooded" or vertebrate animals are considered; in the fourth the "bloodless" or invertebrate animals and the senses generally are noticed; in the fifth and sixth generation and breeding habits are described and, in the seventh, especially those of man; the eighth and ninth books treat "of the psychology of animals," including the feeding and general habits. These categories are by no means exact, however, and various miscellaneous information is interjected. No data are given for the determination of the animals considered except what may be found in scattered places respecting certain characteristics, and many species are only noticed once. It is assumed that the reader will know the animals by the vernacular names of the time.

There is nothing like a system of the animal kingdom and the groups are only such as were and still are recognized by people without special knowledge of natural history. The only categories of classification are the *genos* (genus) and the *eidos* which correspond almost exactly with kind and species or variety of English and are equally vague and to some extent interchangeable. Indeed, as Thompson notes (490^b), Aristotle sometimes "seems to juggle with the terms εἶδος and γένος." The only group designations are those in general use, agreeing with English popular appellatives. Aristotle especially names the most comprehensive "genera" or kinds of "blooded" animals in book I. (Thompson 490^b 9 and 10) and of "bloodless" animals in book IV. (523^b 4–13); the former are Ornithes (birds), Ichthyes (fishes) and Ketoi (whalekind); the latter are Malakia (cuttlefishes), Malakostraca (soft-shelled shellfishes), Ostrakoderma (true shellfishes) and Entoma (insects). Thus each of the Aristotelian "great genera" has received popular recognition among the English as well as other peoples. Aristotle, it is true, says (Thompson, I., 490^b 9–11): "There is another genus of the hard-shell kind, which is called oyster; another of the soft-shell kind, not as yet designated by a single term," which he later (IV., 523^b 5) designated as malakostraka; it does not necessarily follow, however, that Aristotle coined the word for the group; he doubtless took an already existent adjective and used it as a substantive. A few minor kinds or combinations are recognized, as cetaceans (ketoi), selachians (selachia), horse kind (lophuri) and cuttlefishes (malakia), but otherwise the animals "are only named as it were one by one, as we say man, lion, stag, horse, dog, and so on" (I., 490^b 34).

About five centuries later Apuleius, in his singular "Apologia" or "Defence," gave a list of collective designations or aggregates of animals, and Aristotle's group names constituted practically all the natural groups or classes of the fourteen recorded. (Works of Apuleius, Bohn ed., p. 286.) Many centuries were destined to roll away before the list was added to. Indeed, not until the eighteenth century did any naturalist give name to a class independent of popular recognition. Linnæus was the real founder of systematic zoology. It is true that he was to some extent anticipated by Ray in the previous century, but Ray did not give nomenclatural expression to his logical concepts.

Inasmuch, then, as the *genos* and *eidos* are the only categories which have received distinctive names, they only should be recognized. Professor Thompson has done this, but he has used the word "genus" in the same vague manner as Aristotle. That designation, however, has been restricted by modern naturalists to a group of closely related species and often to a single species when that

had no known close relations. The use of the word in the vague Aristotelian sense, therefore, will mislead or at least divert attention, and there is no good reason why kind should not be employed. Oliver Goldsmith, however poor a naturalist, was a master of English and he used that word much as Aristotle did genos. Thompson's method, however, is far preferable to another translator of Aristotle. Dr. Ogle, in his generally praiseworthy version of "Aristotle on the Parts of Animals" (p. 142), explains that "The vague use of the term [genos] makes it impossible to translate it invariably by the same English word. I have therefore rendered it variously — genus — order — tribe — class — natural group — kind, etc., as seemed most convenient in each separate case." Such practise does not convey what Aristotle said or meant, but what the translator thought he ought to say. Most readers will want to know what Aristotle's ideas were and not the editor's.

Another case of usage of a word in a different sense from that current is exemplified by the term malakia, which Professor Thompson has translated by mollusks. Inasmuch as the latter word is universally extended by all naturalists to a great branch of the animal kingdom, of which the malakia form but a small and aberrant fraction, we certainly have some cause to demur; cuttlefishes is an exact English equivalent of malakia. We would prefer to use the last name with the English synonym after it within parentheses. Perhaps others would prefer cephalopods instead.

Undoubtedly many will also wish that Professor Thompson had given the Greek names of species rather than their supposed English equivalents or, rather, in connection with such equivalents. He has, indeed, done so often, but only because he was ignorant or uncertain of the intent of a name. There are probably few readers who would use Aristotle for information about animals; most persons would want to know what names he used for animals and what he said or thought about them. Besides, the greater part of the English-reading people live outside the British Islands and to them such words as adder, angelfish, ant, blackbird, dogfish, grasshopper, lizard, viper and the like may convey a different meaning from that familiar to a native Englishman.

III

If Strabo is to be credited, some of the manuscripts of Aristotle were subjected to extraordinary vicissitudes and only resurrected after more than a century's entombment in dark and damp hiding places. If such were the case[5] with the "History of Animals," naturally in very many places the ink must have been blurred or sometimes completely obliterated. It is told that one Apellicon of Teos attempted the restoration of copy and that various editors of subsequent but early times tried their hands at improvement of the text. Naturally, then, the Aristotle we know must be often different from that which originated from the hand of the great stagirite.

Many emendations have been also made or proposed by various later commentators on Aristotle and many new ones have been suggested by Professor Thompson. Thompson had earned the right, by virtue of his attainments and research, to make such, but some of his predecessors had not. A flagrant case of ill-advised alteration has been furnished in connection with the words *skaros* and *sparos,* the names of two very notable fishes.

Certain authors have proposed to substitute the word *skaros* for *sparos* when it occurs in Book II. (508^b 17);[6] Horace A. Hoffman (1892) was misled by the suggestion and became so confused that he was "inclined to think that the names σάργος, σκάρος and σπάρος are used indiscriminately," and even failed to recognize the *scarus,* perhaps the most famous

[5] There is internal as well as other evidence that the History of Animals was published (multiplied) during Aristotle's life-time.

[6] In this case and the following references the first number in roman refers to the "book" of Aristotle's "History" (II.), the second to the page of the Prussian Academy's edition adopted by Thompson (508^b), and the third to the line of the page (17). There is no other or independent pagination for the version.

fish of the ancients. There is really no confusion in Aristotle's book and his characterizations of the several fishes are quite apt. For instance, according to Hoffman, Aristotle "says the σπάρος (or σκάρος, if we follow the other reading) has many pyloric appendages," [etc.] and that the σκάρος "has its stomach shaped exactly like an intestine, seems to ruminate just as the quadrupeds do," [etc.]; these characters differentiate the two almost as well as a modern ichthyologist would do.

But there is certainly often occasion for emendation of the generally accepted text and one striking example is the nomenclature of certain fishes which are provided with cæca to the intestines; it occurs in book II. (p. 508[b] 17) of Thompson's translation. Probably Aristotle's manuscript had become blurred and illegible at this place and a copyist had inserted words that looked like those that were indistinct or were of the same length.

According to Thompson's version, "Fishes have them [cæca] high up about [round] the stomach, and sometimes numerous, as in the goby, the galeos, the perch, the scorpæna, the citharus, the red mullet, and the sparus." Now, assuming that Aristotle knew what he was writing about, the present text is very corrupt.

The goby (κωβιός) has no cæca whatever and consequently the name must have been substituted for some other. κολίας may have been the original word and the species indicated (*Scomber colias*) would to an eminent degree fulfil the requisite (having very numerous cæca) for the place.

The galeos—"γαλεός or the dog-fish, a selachian"—as Thompson notes—"has no cæca. Sch. suggests γαλῆ (cf. Ael. xv., 11), mod. Gk. γαλία, *Lota vulgaris*, the burbot." That fish has many cæca and therefore would "fill the bill," but unfortunately there is no recent evidence (in Apostolides, Hoffman, Carus or any other recent author) that the fish or the name occurs in Greece. A species that would well answer is the bonito (the μαίὰ of Aristotle, *Sarda pelamys* of recent systematists), which is next in relationship to the *kolias* and whose intestines had elsewhere (506[b] 14, 15) been especially noticed by Aristotle.

The perch of Thompson (in this place) is not the river perch but a serranid (*Serranus scriba*) still known in Greece as the περκα, which has many cæca.

The *citharus* does not fulfil the requisites of the proposition in question and is out of place; the name doubtless has been interpolated; κάνθαρος may have been the original word.

The names *chromis* and *korakinos* have been involved with *skiaina* to some extent. Thus in book IV. (534[a] 9, 10) the "Chromis or Sciæna" is reckoned among "fishes the quickest of hearing," but in book VIII. (601[b] 31) the two names appear for distinct species which suffer "most in severe winters" because they "have a stone in their head, as the chromis, the basse, the sciæna and the braize." Thompson, in a note (IV., 534[a]), declares that the chromis was "*Sciæna aquila* (or some closely allied fish) said to be still called *Chro* in Genoa and Marseilles." The *Coracinus* has been variously identified. "According to Cuvier and J. Müller," it was, says Thompson, "*Chromis castanea* (It. *coracino, corbo*, etc.), the allied fish from the Nile (Athen. *l. c.* [viii., 312]) being *C. niloticus*. *Umbrina cirrhosa* and *Corvina nigra* are known as *corvi*, and are said to spawn in brackish water, but these we identify with σκίαινα or χρόμις." Günther thought that "the *chromis* of the ancients appears to be some sciænoid fish." Investigation of the voluminous literature respecting the species involved and the fishes themselves has led to the following conclusions:

The *Skiaina* was probably primarily the *Sciæna umbra* of Linnæus (*Corvina nigra* of Cuvier), known now in Greece as the *skios*, as well as under other names.

The *Chromis* was apparently the *Umbrina cirrhosa*, to some extent at the present day confounded with the former under the name skios, umbrina, ombrella, etc.

The korakinos, as Cuvier and J. Müller believed, may have been the *Chromis chromis* (*Heliastes chromis* of Günther). "The allied

fish from the Nile," referred to the same genus by Cuvier, has for more than half a century been associated with numerous other African fishes in a distinct family (Cichlids) and its generally accepted name now is *Tilapia nilotica*. *Coracinus* was, however, long a popular name for it, and the "Coracin fish" of Josephus ("Wars of the Jews," III., 10, 8) was doubtless the same or one of the closely related species.

The genera *Sciæna* and *Umbrina* belong to the family of Sciænids and *Chromis* to that of Pomacentrids.

Apropos of the sexual relations of the selachians, Aristotle brought together most of the names of the species he knew. After specific notices of the *batos* (ray), the *trygon* (sting ray) and the *rhine* (angelfish), in Thompson's version (V., 540^b 17) we have this enumeration: "And among cartilaginous fishes are included, besides those already named, the bos, the lamia, the aetos, the narce or torpedo, the fishing-frog, and all the galeodes or sharks and dogfish."

Professor Thompson thinks that the bos is "probably *Notidanus griseus*" and the lamia "one of the greater sharks, *e. g., Carcharias glaucus,* or *Carcharodon Rondeletii.*" Such can scarcely be the case. Aristotle generally instinctively approximated like forms and he especially segregated "all the *galeodes*" (*πάντα τὰ γαλεώδη*). Inasmuch as the *bos* and *lamia* head the list of flat selachians, they were doubtless rays.

The *bos* (*bous*) was almost certainly the *Mobula edentula,* otherwise named *Cephaloptera* or *Dicerobatis giorna.* It is known by analogous names (vaca, vacchietta) along the coasts of France and Italy, and allusion is thereby made to the horn-like headfins (caropteres) which project forwards and forcibly remind the observer of a cow's horns. Devil-fish is the name by which kindred forms are known along the American coasts.

The *lamia* may have been intended for overgrown individuals of the *bous* known only through exaggerated reports. It was possibly interpolated by a later editor.

The *aetos* was undoubtedly the eagle ray, *Myliobatis aquila.* The name is generally supposed to refer to the widely spread wing-like pectoral fins, but Professor Thompson has "little doubt that the original name, still preserved in Sicily, was *pisci acula,* or *ἀκυλέης.*" It is the wing-like expansion and use of the pectorals that is the most striking characteristic of the eagle rays; the spines they share in common with the sting rays (Dasybatids). Professor Thompson might support his conjecture, however, by the fact that, in America, the eagle rays are to some extent called sting rays in common with the dasybatids.

The *φύκης* (male) or *φυκίς* (female) is named by Thompson "the little phycis or black goby" (567^b l. 19) or merely phycis (591^b 16, 607^b 20). The fish is thus identified unhesitatingly with the *Gobius niger,* as was done by Apostolides, who followed Cuvier and Nordmann. The early writers, however, so identified the phykis merely because it had become known as a nest-maker and no other nest-maker than the goby was known. Nevertheless, it is now certain that the Aristotelian fish was not a goby but a labrine. It was declared by Speusippus (in Athenæus) to be like a sea-perch (*Serranus*) which the *phykis* is not; it was associated with labrines by Aristotle (607^b 18), and it is still called phykopsaro in Greece. It is also now well known that several of the European labrines construct nests; those labrines are much more conspicuous and more like the serranids than are the gobies. The *phykis* was therefore identified with a Crenilabrus by Gerbe as early as 1864 and there can be little if any question that it really was a labrine. It was indeed considered by Belon, more than three centuries ago (1580), to be one of the fishes now known as *Crenilabri.* As Gerbe's fine article is almost unknown, it may be noted here as published in the *Revue et Magasin de Zoologie* for 1864 (pp. 255–258, 273–279, 337–340). The nest of a northern species (*Labrus maculatus*) has also been described by J. D. Matthews in the Fifth Annual Report of the Fishery Board for Scotland (1886–7, pp. 245–247).

Among the migratory fishes (IX., 610^b 6, 7) are mentioned "the sarginus, the gar-fish,"

etc. Professor Thompson notes that "while βελόνη in VI., 12, etc., is certainly the pipefish, *Syngnathus,* here it may be assumed to mean *Belone acus,* the garfish: Mod. Gk. βελονίδι, σαργάννος, σαργώννος; It. aguglia. σαργῖνος and βελόνη are probably synonymous, and one or other of them is interpolated." But here, as elsewhere in the "History," the *Belone* is undoubtedly the pipefish. The garpike and pipefish are both very elongate and have the preocular region extended and consequently are sufficiently alike superficially to contrast with other fishes. Assuming, then, that the *belone* is the pipefish, the juxtaposed *sarginos* (not mentioned elsewhere) might be conjectured to be the garfish; the conjecture is sustained by the fact that the garfish in modern Greece and the archipelago bears the names Sargannos and Sargōnnus (as Professor Thompson records), as well as *Sargannos* and *Zargana;* these names are clearly but slight variants of each other as well as from *Sarginos* and the real similarity is scarcely veiled by the vagaries of orthography.

In the index, Professor Thompson distributes the references to *belone* under two categories, (1) the pipefish, 567[b], 571[a]; (2) the garfish, 506[b], 543[b], 610[b], 616[a]. As already indicated, we consider all the passages in question to be referable to the pipefish, and that alone.

In book IX., Aristotle notices the halcyon or kingfisher and especially the nest; he conjectures that "it is possibly made of the backbones of the" *belone,* which Professor Thompson translates "garfish." In a note he adds: "If we ask why of all fishes the βελόνη is specified, it may be because the backbone of the garfish has a peculiar green colour." The Grecian kingfisher, as Aristotle says, "is not much larger than the sparrow," and the garfish is a comparatively large animal and difficult to catch; on the other hand, pipefishes are small, readily obtainable in the vegetation near the shore, and the partly desquamated bodies are easily identifiable.

The question of the nomenclature of the *belone* and *sarginos* has been fully considered in an article "On the Families of Synentognathous Fishes and their Nomenclature" in the *Proceedings* of the United States National Museum (1895, pp. 167–178). To this reference may be made for further details.

IV

Here we must bring our already too lengthy review to a close, although many other passages had been marked for comment or praise. The review has been mostly confined to one class because representatives of that class have been most misunderstood and many species erroneously identified. Professor Thompson's acquaintance with other classes has been greater and he had some years ago published an excellent book on Greek birds.

The new "History of Animals" deserves further commendation on account of its dress as well as contents. It is printed in excellent form, as would be expected, having come from the Clarendon Press. A new feature, so far as English editions are concerned, is the illustration of various passages by apt and clear figures (eleven in number) explanatory of the Greek text which is subjoined. There are remarkably few typographical errors. Such are inevitable, however, in a work of its magnitude, and among them are the transposition of the figures 1 and 2 in explanation of the illustration of *Squilla mantis* (525[b]), 185 instead of 1856 (568[a] note), and *mormirus* in place of *mormyrus* (570[b] note). There is one other lapsus to which attention may be called because it is so often made by other writers.

Professor Thompson has been misled several times by a French custom of individuals or families adding agnomina to their names. The distinguished publicist and translator into French of Aristotle's works, Jules Barthélemy Saint-Hilaire, and the great French naturalists, E. and I. Geoffroy Saint-Hilaire,[7] are all referred to only under their agnomina. In conversation and "for short" the agnomen would be generally dropped, Barthélemy only being used for one and Geoffroy for the other. Thus Cuvier, once the intimate associate of

[7] The "G. St. Hilaire" of p. 612[a] (note) was Étienne Geoffroy Saint-Hilaire (father) and that of p. 631[b] Isidore Geoffroy Saint-Hilaire (son).

Isidore's father and later his antagonist, almost always referred to Étienne Geoffroy St. Hilaire as "M. Geoffroy." In bibliographies and catalogues the respective names are to be found under Barthélemy and Geoffroy.

These are certainly very few and really unimportant blemishes to a work of such general excellence. Before the appearance of the volume, the English-reading peoples were far behind the French and Germans in versions of the "History of Animals." Now we are ahead of all and it will probably be long before it can be superseded by another. Before such shall be the case, the fauna of Greece must be thoroughly explored and doubtless in some sheltered nooks names of animals that have perished in places investigated may be still found in use as in Aristotle's time but under variant modifications. Meanwhile, we shall have reason to congratulate ourselves on the superiority of that which we have.

Theo. Gill

NOTES ON METEOROLOGY AND CLIMATOLOGY

Though authorities agree that climate is practically unchangeable, except when geological time-units are considered, this problem, and especially the corollary relating to mild winters and severe springs, has aroused considerable discussion. The backwardness of spring during the last few years in many parts of the United States has caused considerable alarm among those who are directly affected. In Missouri orchardists have begun to question the policy of continuing the attempt to raise fruit on an extensive commercial scale. In view of these facts, Mr. George Reeder, section director of the United States Weather Bureau, made a study of the cause of the alarm. His investigation has been summarized in a paper, "Late Spring Frosts in Relation to the Fruit Crop of Missouri," which was read at the January meeting of the Missouri State Horticultural Society. It is reprinted in part in the *Monthly Weather Review* for December, 1910. He points out the fact that the daily minimum temperature, rather than the mean temperature for the day, is the important factor, for it is the extreme minimum rather than the mean daily temperature that affects vegetation most. As far as minimum temperatures are concerned, the springs of the last ten years, and particularly the last five years, averaged colder than those of the preceding fifteen years. Not only is the average of the daily minimum temperatures for April and May lower in the last decade than in the preceding two decades, but the frequency of freezing temperatures during these months has been greater of late than formerly. While this is an apparent substantiation of the popular notion that "our climate has changed," he cautions the reader from drawing such a conclusion, suggesting that these changes occur in cycles or oscillations. Data for a sufficiently long period are not available for determining the lengths of these cycles, or for forecasting a change in the present conditions. In conclusion he says, "The popular idea that the climate is changing is evidently an old one, and is caused by the temperature and precipitation conditions remaining for comparatively short periods below or above the normal conditions; such changes should be referred to as oscillations in the weather rather than as changes in the climate."

"The Practical Application of Meteorology to Aeronautics," a paper which was read by the author, Mr. W. H. Dines, before the Aeronautical Society of Great Britain, appears in the *Aeronautical Journal* for January. He showed that the density, the temperature and especially the motion of the atmosphere are of considerable importance to the aviator. The decrease in density of the air with height results in a loss in supporting power, but since the actual resistance to forward motion becomes less, greater speed is possible. The decrease of temperature with height renders it necessary for the aviator to wear thicker and therefore heavier clothing. However, by far the most important consideration in this connection is the wind, both in respect to velocity and to direction. Wind affects aviation in two ways, (1) by its actual presence, and (2) by its steadiness or gustiness. From data obtained by means of kites and balloons, certain