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method of classification was also needed because so many medicines were derived from plants and had to be named accurately. Botany was an essential part of a doctor's education and often this was the sole *raison d'être* of botany teaching.

Different systems were suggested from time to time, and in 1758 Carl Linnaeus, a Swedish botanist, in his *Systema Naturae* proposed two names for every organism. For instance, man is *Homo sapiens*, a dog *Canis familiaris*, and the creeping buttercup *Ranunculus repens*. In this binomial system the first word is the name of a fairly large group of similar beings, the genus. The second word is the name of the smallest and, as Linnaeus saw it, ultimate group, the species. Groupings larger than genus were termed families, orders, classes and phyla excessively.

In order to grasp the value of this scheme we should read a quotation from a book by Thomas Moufet called *Theatre of the World*. Its translation into English was published in 1658:

Some are green, some black, some blue. Some fly with wings, others with more; those that have no wings are those that cannot either fly or leap, they walk; some are of shanks, some shorter. Some there are that sing, some almost infinite, which through the neglect of nature are out of use. Now all locusts are either winged or not winged. Of the winged some are more common and ordinary, some rare, of the common sort, we . . .

Today these hundred words can be replaced by one word. This is the name of the family which contains the locusts, the grasshoppers. The locusts within this family have the common name *Locuste* and the well-known migratory locust, that causes widespread damage in Africa, has the specific name *migratoria*. Its full binomial name is *Schistocerca migratoria*.

With this definite system of nomenclature, identification of organisms became much easier. There was no longer the confusion of languages; a living being had the same name in any country, and common names which varied from locality to locality remained of local interest only. The mallard duck is known by over thirty vernacular names in Britain; to scientists it is always *Anas platyrhynchos*. Today there is an international code enforcing the binomial system and the names proposed for new species, together with changes in names already in existence, are thoroughly scrutinised to prevent repetition. The more recent estimates state that there are over a quarter of a million plant species and over three-quarters of a million

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animal species recorded so far. It is easy to see that without a rational system of classification chaos would result.

To Linnaeus species were God-made entities and completely unchangeable. This rigid attitude, accepted by most of his contemporaries, ignored the difficulties that taxonomists<sup>6</sup> had in placing some organisms into specific groups or in explaining excessive overlapping of characteristics between species.

Species originally were separated largely by differences in structure but, as biological knowledge increased, other criteria were used. It was found, for instance, that some moths, extremely alike in structure, would never breed together and hence had to be recognised as separate species. Certainly they could be considered as distinct as others with marked differences in appearance which readily breed together. Incidentally, similar distinctions are found in more common animals. The lion and tiger are quite different species, yet in fact they will breed together. A liger or tigon is the result.

Some organisms similar in structure live in distinct areas and never, mix or breed. Some American biologists found a bird of this in San Francisco. There the common song sparrow is ubiquitous but is actually found as two types, one in the salt marshes, the other to the dry hillside.

Modern genetics has suggested a method of separating species. It determines the characteristics of organisms then compares them to see whether they should distinguish different types. It has been found that the number of chromosomes is not always very useful. In the vast majority of all the different forms of fruit flies, for example, the same number of chromosomes. We do not know whether genes about genes to allow them to be used adequately and the influence of environment both present difficulties.

Now we can draw our first conclusion about the present state of taxonomy. There is no one universally applicable method of determining species.

The second conclusion can be drawn quite rapidly. All domesticated dogs are included in one species; all present-day human beings belong to the same species. Yet in Scotland the two types of hare, *Lepus timidus* and *Lepus arvensis*, which only differ in their coat colour, size and slightly in the shape of their skull and arrangement of their teeth, are ranked as separate species, or, at least, sub-species. Ornithologists<sup>7</sup> are renowned for distinguishing species on relatively small points of difference, and their exercises of splitting down groups

<sup>6</sup> Greek: taxis, arrangement; nomos, law.

<sup>7</sup> Greek: ornith, bird.