SPECIES. In logic the term “species” is applied to any group of individuals agreeing in some common attribute or attributes, and included along with other groups in a higher category, that of “ genus,” which comprehends the fewer and more general attributes in which all agree and ignores those in which they differ. The application of these terms in logic is thus purely relative ; any genus, however large, may be but a species of a still larger genus. But in arranging the innumerable objects of the natural sciences the naturalist finds it necessary to restrict the terms “ species ” and “ genus ” to the two lowest groupings and to distinguish the higher aggregates by special terms, as “ family,” “ order,” “ class,” &c. Early writers had but a loose conception of many different “ kinds ” of animals and plants, and spoke only of species and genus in their purely logical relations, with varying breadth of content. The term “species” was limited to its natural history usage in the end of the 17th century by John Ray. His con­ception of “ specific characters ” rested, not only on close and constant resemblance in outward form, but also on the likeness of offspring to parent, a considerable measure of variability being, however, recognized. Amongst sub­sequent authors this conception of common descent or parentage became more and more prominent, while the progress of successful definition of species made the limits of their variability seem always narrower and of less im­portance ; and in this way the useful working conception of the tolerable definiteness of species gradually crystallized into the absolute dogma of their fixity. Then Linnæus in his *Philosophia Botanica* gave the aphorism “species tot sunt diversæ, quot diversæ formæ ab initio sunt creatæ ” (we reckon just as many species as there were forms created at the beginning), which was generally accepted. Buffon’s obstinate rejection of the Linnæan classification was asso­ciated with a belief in the modifiability of species, and showed some foresight of the doctrine elaborated soon afterwards by Lamarck *(q.v).* The general acceptance of this dogma was, however, effected by the influence of Cuvier ; its overthrow dates only from the publication of Darwin’s *Origin of Species* (1859), of which the argument need not be here repeated. (See Evolution, Morpho­logy.) The genealogical conception of species was thus established more firmly than ever, though cleared from its former associations ; in Haeckel’s phrase, the species is the whole succession of organisms which exhibit the same form in the same environment. The rash generalization, that distinct species are to be recognized by their inca­pacity for the production of fertile hybrids, was next over­thrown, while closer study has cleared away the notion of the equal definiteness of all specific forms. We now know that, while many forms, like the pearly nautilus or the Venus’s fly-trap, do indeed exhibit the most perfect specific definiteness, the demarcation of equally definite species in other genera is rendered impossible by the existence of the most complete series of transitional forms, and the number of the species defined thus comes to depend simply on the personal equation of the systematist, on his predilection for “lumping” or “splitting,” as the case may be. Thus, for example, the number of described German species of hawkweed *(Hieracium)* has ranged from 300 for one author, through 106 for another and 52 for a third, to less than 20 for a fourth. Similar instances of variable genera are afforded by the willows and the brambles, and many other common forms. This wide variability, as might be expected, seems to be more pre­valent among the lowest forms of life, and the classical example of the relativity and variability of species has been furnished by Haeckel’s beautiful monograph on the calcareous sponges *(Monographie der Kalkschwämme,* Jena, 1872), in which he offers twelve distinct arrangements of

the same set of forms from various points of view, among which the two most nearly conventional propose respect­ively 21 genera and 111 species and 39 genera and 289 species. All such variable forms are in fact species in the making, which become definite in proportion as certain varieties become especially adapted to their environment, and become isolated by the dying out of the intermediate forms. With these limitations, however, the working use­fulness of the morphological conception of species remains undiminished. The want of any absolute standard of specific difference is largely made up by practical experi­ence and common sense; and the evolutionary systematists are less in danger than were their predecessors of either exaggerating or understating the importance of mere varieties. (See Variation.)

SPECIFIC GRAVITY. See Hydrometer, vol. xii. p. 536 *sq.*

SPECTACLES are flat glasses, prisms, spherical or cylindrical lenses, employed to detect and correct defects of the eyes. They are made usually of crown glass or rock crystal (“ pebbles ”), the latter being somewhat lighter and cooler to wear. They are mounted in the well-known rigid spectacle frame when for continuous use,—eye-glasses being preferable where they are worn intermittently, and hand­glasses or lorgnettes where they are required to supplement temporarily the spectacles usually worn, or where, as with extreme shortness of sight, no glass could be employed with comfort for any length of time.

*Preserves.—*Preserves are used to conceal deformities or to protect the eyes in the many conditions where they cannot tolerate bright light, such as ulceration and inflammation of the cornea, certain diseases of the iris, ciliary body, choroid, and retina. They are made of bluish, “ smoked,” or almost black coloured glass, and are of very various shapes, according to the amount of obscuration necessary.

*Prisms.—*Prisms are of great value in cases of double vision due to a slight tendency to squinting, caused by weakness or over-action of the muscular apparatus of the eyeball. Prisms deflect rays of light towards their bases. Hence, if a prism is placed in front of the eye with its base towards the nose, a ray of light falling upon it will be bent inwards, and seem to come from a point further out from the axis of vision. Conversely, if. the base of the prism is turned towards the temple, the ray of light will seem to come from a point nearer the axis, and will induce the eye to turn inwards, to converge towards its fellow. In cases of myopia or short-sight owing to weakness of the internal recti muscles, the eyes in looking at a near object, instead of converging, tend to turn outwards, and so double vision results. If a suitable prism is placed in front of the eyes the double vision may be prevented. These prisms may be combined with concave lenses, which correct the myopia, or, since a concave lens may be considered as com­posed of two prisms united at their apices, the same effect may be obtained by making the distance between the cen­tres of the concave lenses greater than that between the centres of the pupils. Again, to obviate the necessity for excessive convergence of the eyes so common in hyper- metropia, the centre of the pupil should be placed outside the centre of the corrective convex lenses ; these will then act as prisms with their bases inwards. Where, on the other hand, there is no tendency to squinting, care must be taken in selecting spectacles that the distances between the centres of the glasses and the centres of the pupils are quite equal, otherwise squinting, or at any rate great fatigue, of the eyes may be induced.

*Spherical Lenses.—*Biconcave, biconvex, and concavo- convex (meniscus) lenses are employed in ophthalmic prac­tice in the treatment of errors of refraction. Until recently these spherical lenses were numbered in terms of their focal