

series, and only two of three joints. But, excepting in rare cases like this, the predominant characters of the individual may be safely taken as those of the type, and the formula constructed accordingly.

Bell's method of writing a formula for every slight variation, as he has done in the case of *Actinometra variabilis*, would result in the following list of formulæ for *Actinometra parvicirra*.

$$a.(3); a.\binom{3}{2}; a.3.(2); a.3.\binom{2}{3};^1 a.3(3); a.2.\binom{2}{3}; a.2.(3), \text{ and so on.}$$

Such a collection of formulæ would be worse than useless from its confusion, and very far from being the shorthand system which Bell rightly wishes to see employed. It would be much easier to refer to the specific diagnosis at once than to try and make out the predominant characters of the arm-divisions from a supposed shorthand of this kind.

Two points must therefore be noted in determining the formula of a species. 1. What are the characters of the majority of the arm-divisions in a given individual, or better still, in a number of individuals? 2. Whether examples ever present themselves in which a given character, such as the occurrence of distichal, palmar, or post-palmar divisions, is sometimes entirely absent? In this case, but only in this, the corresponding symbol should be put between brackets in the formula, *e.g.*—

Antedon lusitanica, A.(2).

Actinometra parvicirra, a.3.[3.(3)].

Actinometra multiradiata, a.3.2{p.(p')br}.

But the fact that all the ten distichals or twenty palmars do not always occur in every individual of a species is no reason for placing the corresponding symbol in brackets. Were this done, I have no hesitation in saying that both symbols would have to be enclosed in brackets in the formula of every species with less than forty-one arms and no post-palmar divisions. This of course would be absurd, and render the use of formulæ altogether futile.

The principles of classification which have been explained above² enable us to divide the numerous species of *Antedon* and *Actinometra* respectively into groups of very variable size. These are arranged in the following lists, which contain the names of all the species described by myself and my predecessors, Retzius, Lamarck, Müller,

¹ This is similar to the expression given by Bell for *Antedon elegans*, in which there are generally two palmars, but sometimes three. His figured specimen presents one case of the latter to four of the former; and it is therefore clear that the formula should be written A.3.2.

² I may just remark here that I cannot at all agree with the dictum of Walther that "Wer sich je mit Crinoiden beschäftigt hat, der wird wissen, wie wenig specifischen Werth die Gabelungen der Arme besitzen" (*Palæontographica*, 1886, Bd. xxxii. p. 182). Walther's experience seems to have been limited to a comparatively small number of fossil Crinoids, not always in the best state of preservation. But so far as concerns the recent Crinoids, both stalked and free, the number and characters of the arm-divisions afford points of much importance in the discrimination of species. I am convinced that the same may be said of the fossil Neocrinoids, if not of the Palæocrinoids too, provided that a sufficient range of specimens is brought under consideration.