as it is inconsistent with many ascertained facts which were specified in my first letter, the hypothesis of "Aggressive Mimicry" should surely be withdrawn.

No speculation is needed to enhance the exceptionally interesting facts of the Variation and the resemblances of the *Volucella*. If a number of people will set to work on this problem in the way suggested, there is, I think, a fair chance of considerable results. It was in the hope that such effort may be made that I drew attention to the matter, and I am really sorry that Mr. Poulton should be hurt thereby. Nevertheless, I cannot but regard his account of the matter as an example of the way in which statements pass on from one writer to another, but prove on inquiry to be baseless. WILLIAM BATESON.

St. John's College, Cambridge, November 14.

Parasitism of *Volucella*.

MR. BATESON's interesting discussion of the relations between *Volucella* and the species of *Bombus* (NATURE, vol. xlvi. p. 585) suggests the following observations:—The nest of *B. muscorum* is made without much effort at concealment on the surface of the ground. If accidentally disturbed the inmates set up a peevish buzzing, which, no doubt, answers the purpose of warning off ordinary intruders. Yet *B. muscorum* is of a patient and gentle disposition, and will put up with a good deal of maltreatment before using its sting. Its sting, moreover, is less venomous than that of either of our other common humble bees. It apparently trusts to the reputation of its genus for protection from annoyance. Such a creature would seem marked out by Nature as the very host to be imposed on by a parasite like *Volucella*, which, on the other hand, may need all its cunning to come round an irascible being like *B. lapidarius*, or even like *B. hortorum*. And, in fact, as Mr. Bateson points out, we find it multiplying abundantly at the expense of the first named bee, and less frequent in the nests of the other two. Notwithstanding this, *B. muscorum* appears to be certainly no less successful than either of the others in the struggle for existence. W. E. HART.

Falmore, Carrowmena, co. Donegal.

Optical Illusions.

THE illusion of the Gothic arch in NATURE (vol. xlvii. p. 31) is too good to have a rival, but simple Norman arches occasionally practise a deception of some subtlety. In certain cases they seem to be of the Moorish horse-shoe form; this happens when the semicircle does not spring at once from the capitals of the Norman columns, but has a short intervening vertical space of masonry. Architects are familiar with the effect, and call these arches stilted; they say the stilts are commonly vertical, although Norman walls have no doubt sometimes fallen away from the upright course. I suppose the eye is quick enough to perceive that there is more than a semicircle, while the mind is gullible enough to infer that the curvature is continued. In Winchester Cathedral there are some good illustrations of this appearance.

Winchester College, November 12. W. B. CROFT.

A Strange Commensalism—Sponge and Annelid.

A CURIOUS case of what I believe to be definite commensalism between members of these two classes came under my notice the other day when collecting, and, as it is, so far as I know, a new instance in this interesting inter-relationship between animals, I venture to record it.

Several large patches of crusting orange-red sponge attracted my attention because of the peculiarly emphatic markings of what appeared to be the oscula. They were suspiciously unlike anything spongiform, so I secured some good pieces of the sponge for further investigation. Sections proved them to belong to the *Microciona plumosa* of Bowerbank, but the supposed oscula—which to the naked eye appeared as innumerable tiny black specks, each surrounded by a grey ring—proved to be, when the mass was teased out in water, in reality the ends of tubes inhabited by an eyeless *Leucodore* (*L. cæca*, Œrsted). Fully forty could frequently be counted in a square inch.

The conclusion I come to after examination of a large number of specimens is that actual benefit is mutually given and received by each of the two messmates; the sponge gaining considerable support and extra consistency from the numerous comparatively wiry upright tubes. There is also the question whether the excreta of the worms is of any food value to the sponge. On the part of the worms, there is little doubt that it finds a valuable protector in the sponge which by the way is characterized by an intensely rank smell of garlic (warning odour?). I have seen no signs of this sponge being preyed upon by any animal, so we may conclude its protective devices of spicules, odour or taste are fairly successful. A worm whose tube is sunk completely in its substance will naturally be very safely housed, and besides, the friendly water-currents set in motion by the sponge cilia will bring much food matter to its very mouth.

Bowerbank in his description ("Br. Spongiadæ," vol. ii. p. 134) writes of a specimen as "permeated by some small tubular zoophyte which it has coated with its own tissues, and from these adopted columns defensive spicula are projected"—evidently the same as I describe above, though he makes the mistake of considering the tubes as those of zoophytes instead of those of annelids. From this quotation, however, it is evident that the habit is widely spread, and not merely local. Here at extreme low-water the sponge grows exceedingly abundant, and the commensal worm seems always present.

JAMES HORNELL.

Jersey Biological Laboratory, November 10.

Induction and Deduction.

MR. DIXON says that there are "at least three different kinds of interpretation which may be put upon the proposition, [An isosceles triangle has equal angles at the base]. It may mean (1) the triangle used to illustrate this proposition has equal sides, therefore it has equal angles; or (2) I have conceived a triangle which has equal sides, therefore I have conceived one which has equal angles; or (3) the connotation ascribed by the adjective isosceles implies the connotation 'having equal sides' [? angles]."

He goes on to observe that the difference between either (1) or (2), and (3) is "that this latter gives us no information about any real thing or concept, but only about what is implied by using certain terms," that is, about the connotations of "isosceles" and "having equal angles" ("equal sides" is of course a slip). But if connotation refers neither to the attributes of "real things" nor to "concepts" (which I suppose means ideas or notions) what can it be that we "imply" by using the terms *isosceles*, &c.? If we do not mean things, nor attributes of things, nor ideas, do we mean anything which can convey or contain information?

In Mr. Dixon's view the terms do convey information, but information which "clearly does not require to be based upon any real knowledge of things, but may be based solely on definitions of words." But must not definitions of words be based, in the last resort, upon knowledge either of things or of concepts—definitions of current words in some current sense, or even of strange words in strange senses—as *e.g.* if I say Abracadabra means ixtra-mixtra, and Triangle means abracadabra, and all abracadabras are four-sided, and so on? With such propositions I may certainly frame syllogisms and arrive at "symbolical" conclusions, though I cannot see that I shall be doing anything to convey information or to advance thought.

And when Mr. Dixon says that the proposition "an isosceles triangle has equal sides" has "wide applicability and usefulness" because we "often find things which can fairly be called isosceles triangles," it seems clear that he himself cannot have taken the proposition at starting in a sense purely "symbolic" (in his meaning of that word). If he did, it would be little less than miraculous that an entirely arbitrary definition should happen so to fit actual experience, especially when we consider that other equally symbolical mathematical propositions have an equal applicability.

I think it is probably true that we often do not depend, for our assent to complicated reasonings, on anything like full "realization in succession of the actuality of the relations and operations discussed"; but I cannot admit that such reasonings do not refer to objects of experience or of thought. Unless the terms did refer to something other than themselves, we could never assert S is P, or $x = y$.

I unfortunately know nothing either of Pascal's theorem or of the intersections of two conics; but I think that in the case of the individual isosceles triangle, my intuition that the equality of angles at the base is inseparably connected with equality of sides, gives me ample ground for believing it to be "mathematically certain" that every isosceles triangle has equal angles at the base; it is self-evident that the one characteristic cannot exist without the other. That the isosceles triangle in question, if put under a microscope or tested by some micrometer, might turn out to be not "really" isosceles, seems to be a perfectly