CORRESPONDENCE.

THE SPECIES CONCEPT IN PALAEONTOLOGY: AN ANALOGY.

SIR,—In his lucid and stimulating remarks on the species concept in your August issue, Dr. Trueman accurately reflects the trends of palaeontological thought. For some time past palaeontologists have come to see how their supposed lineages are really composite and may be more properly regarded as series whose terms have been appropriately culled from bundles of parallel lineages. These lineages are parallel in that the different characters of the organisms comprising them have evolved along similar lines, though in its evolution, each character was largely independent of others, and its rate of evolution was fast in this lineage and slow or even stationary in that.

Dr. Trueman now claims that any such bundle has many anastomoses caused by the free interbreeding of the forms constituting it, so that we must now think of a plexus of freely interbreeding forms rather than a bundle of parallel lineages, but a plexus showing a general progress along definite lines. That is to say, a transverse section " low down " in such a plexus will show a predominance of forms in an early stage of evolution, while a section " higher up " will show a large percentage of advanced forms. The particular instance that Dr. Trueman has in mind is that of the Hettangian and lowest Sinemurian oysters.

Having in mind this instance and others, such as the Senonian Polyzoan *Pelmatopora*, I would suggest that the free interbreeding was confined to the earlier stages of evolution, and that the system, though at first a plexus, soon became straightened out into a bundle of parallel lineages. Indeed, Dr. Trueman hints at such a view when he speaks of " broader limits of infertility ".

An excellent illustration of such a system confronted me while I was reading Dr. Trueman's paper in my garden—an analogy that may be worth handing on to your readers. In a circular flower-bed about 2 ft. in diameter, plants of *Ipomaea purpurea* were climbing sixteen parallel strings. If each plant represents a lineage, then the whole system corresponds to a bundle of parallel lineages, and the ontogeny of each plant to the phylogeny of a lineage. Moreover, as each plant is followed from the bottom to the top of its string, its characters are seen to change ; for instance, the petioles shorten, the internodes lengthen, and the number of flowers in each inflorescence increases ; so that a transverse section of the system at 5 ft. from the ground will show later stages of ontogenetic development than one at 6 inches or a foot from the ground. But a given transverse section will also show that the plants on all sixteen strings are not at the same stage of development, and that even in the ontogeny of a single plant some characters have developed faster than others ; for instance, at the height of four feet the internodes of one plant may be decidedly longer than those of another. More-

over, the heights of the several plants are different, though all were sown at the same time. Differences in the comparative rates of ontogeny of the individuals and in the rates and degrees of development of the different characters are generally ascribed either to differences of environment or to "individual variation", i.e. to causes inherent in the individual which may be unknown or partly known, such as differences in gametic composition. The differences of individual environment of the plants under consideration must be very slight and no more than those of the different members of parallel lineages found where they grew and died together in the same geological bed; and the differences of rate and degree in the development of their ontogenetic characters is probably mainly due to individual variation. Similarly the differences of rate and degree exhibited by the trends of parallel lineages are probably due in a large measure to "individual variation" of the lineages, i.e. to causes inherent in the individual lineages. But here our analogy fails; for the ontogeny of an individual is largely a recapitulation of ancestral, and at least a repetition of parental, characters, while the evolution of a lineage is a march along new lines.

Again, if the relation of a species to its genus is similar to that of the individual to its species, then, to be logical, we must name our bundle of parallel lineages as a genus, and each lineage as a species; the arbitrary points on a lineage, which we have been accustomed to name as species, or as mutations in Waagen's sense, must be termed merely phylogenetic stages in the life-history of a species; and the nodes of Dr. Trueman's supposed plexus must be described as hybrids. Without advocating or deprecating such a course, I would simply moot its desirability.

New species may be regarded as arising either as hybrids at the nodes near the base of the plexus, or as new offshoots from a persistent radical. This supposed basal plexus is represented in the illustration just given by the chance crossings and wanderings of the stems before they find the string up which they ultimately climbed. Suppose that, when such crossing stems touched, they could fuse and produce at that point a hybrid shoot, this would illustrate the origin of a new species produced as above suggested.

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TYPE-SPECIMENS.

Sir,—The Governing Body of the Imperial College of Science and Technology having decided that it is undesirable to retain type-specimens of fossils in a palaeontological collection used for teaching purposes, it may be of interest to record the transfer of the very few specimens concerned to the several museums chosen as most appropriate in each case.

1. To the British Museum (Natural History)—holotype of