time, that the *flowers* of *Drosera* and *Nepenthes* are carnivorous, and that the problem of cross-fertilization is 'normally insoluble.' Here, also, obsolete terminology is perpetuated in the expression 'fertilization of the stigma,' and obsolete interpretation in referring to the stigma as the 'female organ,' and to the stamens as the 'male organs' of the flower.

The fact, stated in the first article, that the Virginia creeper or the convolvulus will begin to twine about the handle of a rake, temporarily laid against a wall, does not seem, in the author's mind at least, at variance with the clear 'perspicacity,' 'intelligence' and 'prudence' with which plants in general are attributed elsewhere in the articles. One wonders, though, why the convolvulus did not 'set its thought to working,' as did the *Silene Italica,* mentioned a few lines farther on. But doubtless we have failed to enter into the spirit of the author, for later he implies intelligence to the mountains, the seas and the stars.

'The flowers,' we are told, 'came upon our earth before the insects.'[1] This 'geologically incontestable fact' is, alone, 'enough to establish evolution'!

But the discoveries of recent science sadly pale in comparison with the root-intelligence described in a foot-note to the first article, and credited to Brandis. Thus:

> This root, in penetrating into the earth, had come upon an old boot sole: in order to cross this obstacle, which, apparently, it was the first of its kind to find upon its road, it subdivided itself into as many parts as there were holes left by the stitching needle; then, when the obstacle was overcome, it came together again and reunited all its divided radicles into a single and homogeneous tap-root.

Of course no one could state, *a priori,* that such a marvelous feat was impossible, but it is the kind of tale to which one more readily gives credence if substantiated by photographic evidence. Without such evidence the event, as narrated, is absolutely incredible to any botanist. But even if such an act were common for roots, by what stretch of the imagination could one infer that a root could have preconceived and reasoned out the plan so deftly executed?

There is much in these articles of interest, and of scientific accuracy, and the apparent appreciation, in the last one, of the value of the experimental study of variation is very gratifying.

"All that we observe within ourselves," says Maeterlinck, "is rightly open to suspicion; and we are too greatly interested in peopling our world with magnificent illusions and hopes." Perhaps this explains the impossible botany of the articles, but it can not excuse it.

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NEW YORK BOTANICAL GARDEN,
April 30, 1907

[1] That insects appeared in Silurian times, and that there is no certain evidence of angiosperms earlier than the Cretaceous, are facts of paleontology too well known to be dwelt upon here.

CONCERNING LEFT-HANDED ABORIGINES

A RECENT article in SCIENCE requested people in charge of Indians to find the proportion of left-handed aborigines to the right-handed ones. Acting upon that request, the writer has been investigating the subject among the Hoh and Quileute Indians, and, out of a population of 231, five left-handed people were found: How-withlup (male), Wa-lo-thlu (male), Hick-sh (male), Thle-ba-tolch (male), Hi-yic-to-utl (female).

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UPLIFT INCREASES RAINFALL, DENUDATION DIMINISHES IT

IT has long been known to students of geography that in most parts of the world more and more rain and snow is observed to fall as one examines greater and greater heights on the slopes of hills and mountains up to very considerable elevations. Hellmann's new rainfall map of Germany shows this to be true even of the very flat hills on the plains of northern Prussia. At any point on this plain the hills are a little wetter and the valleys drier than the ground about. Dr. Kassner has suggested in the February *Petermann* that in regions of subdued mountain form there must,

therefore, have been greater rainfall in the past when erosion had not accomplished so much of its leveling effect, and remarks that a map of that old-time distribution of rainfall is capable of construction on the basis of the approximate land elevations of the land before denudation took place. In this sense the denudation of the land has been accompanied by diminution of precipitation. It should be remembered, however, that regional uplift has the opposite effect and has not infrequently been the occasion of increase of rainfall and denudation. The Black Hills of South Dakota, for instance, have more rainfall than the region about because of the domed uplift of the region above the plains. It is estimated that 3,000 feet have been removed from their summits by denudation since this uplift and this Kassner would suggest must have been accompanied by diminution of rainfall. But it is quite conceivable that the summits have never been more than 700 feet above the sea, for denudation has been lowering them at the same time that doming has thrust them up. In that case there has been no reduction in height or diminution of rainfall. When uplift ceases and denudation alone controls the elevation, rainfall must undergo the diminution spoken of, but the complete cycle of changes began with increase of rain as the doming first began. This supplied the abundant transporting agent with which erosion resisted further effective uplift and brought increase of precipitation to a halt much as the governor controls the throttle of an engine. From what we may call a mature stage of rainfall, reached likely enough in geographic maturity of the mountain forms, Kassner's diminution must come in.

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Special Articles

The Development of Unfertilized Frog Eggs Injected with Blood

During three successive springs (1905–7) the writer has experimented on unfertilized frog eggs by injecting them with blood or lymph of either male or female frogs. In all some fifteen hundred eggs have been so operated upon. Shortly before the time for laying, the eggs were taken from the uterus with every precaution to prevent contamination by sperm. Those nearest the cloacal opening were always set aside as a control and in not a single instance did any of them develop. The other eggs were pricked with a very fine-pointed capillary tube which had previously been charged with lymph and corpuscles by dipping it into the lymph or the blood of another frog.

In eggs so treated numerous instances of cell proliferation and embryonic development have been observed, provided the eggs were fully matured and ready for fertilization. Many eggs after six or eight days showed upon sectioning that they had approximated the full blastular and in some cases the gastrular stages, although the condition came about apparently by some sort of internal nuclear arrangement, as no superficial cleavage furrows were observable and no demarcation into cells was visible from the exterior until the third or fourth day, when close inspection showed in some cases numerous small vesicular or cellular outlines.

In some instances definite organs were developed, though frequently distorted and misplaced. Cross-sections of one embryo, for example, showed such pronounced defects as two neural tubes anteriorly. Of the whole number of eggs operated upon only two developed into free-swimming tadpoles and these were apparently normal as far as superficial examination disclosed. They have not yet been sectioned. After sixteen days one died and the other was killed to insure proper fixation for histological study.

Apparently the white rather than the red corpuscles are the stimulating agents which bring about development, because injections of lymph, which contains only white corpuscles, produce the same effect as injections of blood. Whether or not the fluid part of the lymph or blood produced any effect could not be definitely determined from the material at hand. The whole effect seems, however, to be the result of the proliferation of the leuco-