of south-eastern Arizona, by Wm. M. Courtis. Mr. Davenport considers it one of the most elegant species yet discovered and so different from any known form that, although the material is scanty, he has no doubt as to its claim to rank as a genuine species. "There is no other species with which it can be compared. Under the microscope, the white powder (upon the fronds) separates into distinctly stalked gland like bodies with enlarged conical, flat or inverted heads like a miniature host of fungi, with their variously shaped caps. With a power of 200 diameters, or even less, the scales of the frond appear to be composed of elongated, cylindrical, tapering tubes, containing a light brown coloring matter, collected into a mass at the base, or in spots at intervals throughout the length of the otherwise whitish scales, which are thus made to appear jointed."

American Naturalist, June.—This journal, of course, runs to Zoology, as is to be expected from the tastes of both its editors. Every department has a specialist in charge of it except botany, and, of course, the botanical notes lose just that much in force and authority. But the wants of botanists have not been entirely neglected, and we have to thank the *Naturalist* this year for several valuable articles. The most interesting one in the June number is Prof. C. E. Bessey's on "The Supposed Dimorphism of Lithospermum longiflorum." The author seems to have made a most exhaustive study of this species, carefully measuring the length of corolla tube, the height of anthers and the height of stigma of over 60 flowers, with the view of testing the supposed dimorphism. The results show great variation in the measurements, but nothing like the well-marked differences that appear in true dimorphism, such as that of the nearly allied *L. canescens*. The results are summed up as follows:

1st. The length of the corolla is exceedingly variable.

2d. The distance from the anthers to the top of the corolla tube is approximately uniform, so that the position of the anthers is largely dependent upon the length of the corolla tube.

3d. The length of the style is even more variable than that of the corolla tube.

Mr. E. Greene writes that in his article on "Certain Silkweeds" in the last Gazette, it should read of *A. Sullivantii* that it is more common in Minnesota than in other locality further south, rather than "north," as it is printed. Also *A. speciosa* has not been reported farther east than Nebraska, instead of "Nevada."

Hygienic and Therapeutic Relations of House Plants, by J. M. Anders, M. D., Ph. D.—This small pamphlet of sixteen pages is a reprint from the Philadelphia *Medical Times*. It will be remembered that Dr. Anders last year published in the *American Naturalist* some articles in which were recorded some very careful observations with regard to the moisture evaporated by plants and their beneficial influences. The present paper is meant as an answer to the common question, "How do plants in rooms affect the health of the inmates?"

We make no apology for making some extracts from a paper which deals with a subject of universal interest:

"The old question of the effects of living plants on the air of houses is one of considerable interest. The family doctor is often confronted with the query, "How do plants in rooms affect the health of the inmates?" Formerly, it was the universal opinion that they were injurious to health, particularly in the sleeping room and sick-chamber. Unfortunately, this still continues to be a popular impression. To review the various views on this topic, down to the present, would be foreign to the scope of this article and quite out of place. The discussion will necessarily be confined to the present state of our knowledge concerning this subject, and especially such of its bearings as are interesting from a medical point of view.

"Three of the chief functions in plant life are the absorption of carbonic acid, the exhalation of oxygen, the generation of ozone. Now, it has been conclusively shown that variations in the amount of these gases from the presence of any number of plants have no appreciable effect on the air of an apartment, the absorption and exhalation of these substances being carried on too slowly either to improve or to vitiate the air.

There is, however, yet another process in plants, which in this connection is of far greater importance, viz., that of *transpiration*. By this term is meant the exhalation of moisture by the leaves. About this function very little was known until recently. Careful investigations of the subject have been made by the writer to which brief reference only can be made here, for they have formed the basis of a paper elsewhere It may suffice to say that the average rate of transpiration for plants having soft, thin leaves, as the geranium, lantana, etc., is one and half ounces (by weight) of watery vapor per square foot of leaf surface for twelve diurnal hours of clear weather. In order to convey some notion of the great activity of this function, it might be stated that at the above rate the Washington elm, at Cambridge, Massachusetts, with its two hundred thousand square feet of leaf surface, would give off seven and three quarter tons of water in twelve hours. In the twenty-four hours an in door plant will transpire more than half as much as one in the open air. It would appear to follow naturally from these facts that growing plants would be capable of raising the proportion of aqueous vapor of the air of closed apartments. And this suggestion prompted the writer to make observations with the view of establishing this fact experimentally. By means of the hydrometer, the atmosphere of two rooms at the Episcopal Hospital, in which the conditions and dimensions were in every respect similar, were tested simultaneously, in order to note the variations produced by growing plants. In the window of one of the rooms were situated five thrifty plants, the other contained none.

For eighteen consecutive days the dew-point of the room containing plants gave an average complement one and a half degrees lower than the room in which there were no plants. Thinking that

possibly this difference of humidity might not be owing solely to the presence of plants, the conditions were varied, and further observations made, with similar results. The manner in which these investigations were carried out cannot be here detailed. The following conclusion should, however, be quoted: "During the summer months, when the windows are thrown widely open and the doors kept ajar, the influence of transpiration is quite inconsiderable; on the other hand, when the interchange of air is not too rapid, a sufficient number of plants, well watered, have the effect (if the air be not already saturated) of increasing the amount of moisture to a considerable extent." This point, as will be presently seen, is of special importance where houses are heated by dry air furnaces."

Then follows the record of a number of cases, from which the following conclusions are drawn:

"From the above cases it will be seen that what we had deduced from experimental results concerning the health giving effects of plants (which is owing to transpiration increasing the humidity of the air,—the plants acting as natural and perfect "atomizers") is entirely in harmony with what is observed concerning the effect of sufficiently moist warm air in many cases of phthisis, and if it is true, as we have attempted to demonstrate, that house-plant hygiene constitutes a valuable preventative measure where there is hereditary tendency to certain diseases, then it ought to be definitely and thoroughly understood, and it is of vital importance that it should be adopted in cases where there is known predisposition to phthisis, for half of the cases are supposed to be preventable, whereas if the disease be allowed to develop, complete recovery is not to be expected. Furthermore, though the keeping of plants does not "cure" confirmed cases of phthisis, it is nevertheless very useful to prolong life, and by ameliorating the distressing symptoms renders existence at least endurable—an office not to be despised in such a wide-spread and lingering disease.

Observation teaches that advanced cases of phthisis (as, for instance, where cavities exist) are benefitted by a more decidedly moist atmosphere than is required in health, and hence they will require a much greater profusion of plants in the room than those who have the disease in a more incipient stage.

The plants should be well selected and kept in a thriving condition. The chief points to be borne in mind in the selection of the plants are, first, that they have soft, thin leaves; secondly, foliage-plants or those having extensive leaf-surface are to be preferred; thirdly, those which are highly scented (as the tuberose, etc.) should be avoided, because they often give rise to headache and other unpleasant symptoms.

In order to facilitate a practical application of the data gained by experiment, the following formula has been carefully prepared: Given a room twenty feet long, twelve feet wide, and ceiling twelve feet high, warmed by dry air, a dozen thrifty plants with soft, thin leaves and a leaf-surface of six square feet each would, if well

watered, and so situated as to receive the sun (preferably the morning sun) for at least several hours, raise the proportion of aqueous vapor to about the health standard

This formula may serve as a guide in the use of plants for hygienic purposes; but under conditions of actual disease it will be necessary to increase the proportion of plants according to the degree of humidity sought, or as the indications of individual cases may demand.

It should be stated that, to obtain the best results, both the rooms occupied during the day and the sleeping apartment should contain plants. It was for a long time the opinion of scientific interpreters generally that plants in sleeping apartments were unwholesome because of their giving off carbonic acid gas at night; but it has been shown by experiment that it would require twenty thrifty plants to produce an amount of the gas equivalent to that exhaled by one baby-sleeper: so this is no valid objection to their admission, and not to be compared with the benefit arising from their presence.

We have no desire to underrate other means of treatment while upholding the importance of our subject. Exercise in the open air is of immense advantage in phthisis, and during the warm season the consumptive should be moving among his garden-plants, and, if he be a lover of flowers, should assume personal charge of them. Again, no one will dispute the value of certain tropical climates for judiciously selected cases of phthisis; but the practice of indiscriminately sending patients to them is certainly to be deprecated.

New health-resorts (many of them comparable only to the patent nostrums) are constantly being pressed upon the public, but too often a trial of them brings only disappointment, and the consumptive is rendered more miserable by the annoyance of travel and the anxiety of being separated from all the endearing relations of home. And even where travel is desirable, it is, for financial or other reasons, quite impossible in a large proportion of cases.

To have always at hand and readily available so complete and withal so agreeable a health-resort at home as that furnished by a room well stocked with plants must prove an inestimable boom to the despairing invalid.

The Origin and Survival of the Types of Flowers.—In a lecture delivered before the California Academy of Sciences, October, 1879, Prof. Cope proposed the hypothesis that "the consciousness of plant-using animals, as insects, has played a most important part in modifying the structure of the organs of fructification in the vegetable kingdom. Certain it is that insects have been effective agents in the preservation of certain forms of plants." Dr. Hermann Mueller has recently published a book in which he seeks to explain the existing variations in the forms of flowers on the principle of selection. He supposes that insects of different tastes bred peculiar flowers, just as men breed peculiar races of cattle. Carrion loving insects bred their kind of flowers, and long-tongued insects, the tubular kinds, and

many other classes of insects have, each class, bred the flowers they love best.

Dr. Mueller is abundantly able to theorize on this subject, and his views, so far as they go, will command the assent of most persons. But like all the Darwinians, he confounds survival or preservation of characters, with the origin of characters. On this subject Prof. Cope has the following: "I would suggest whether the mutilations and strains they [plant-using animals] have for long periods inflicted on the flowering organs may not, as in some similar cases in the animal kingdom, have *originated* peculiarities in structure."—*American Naturalist.*

SOUTH-WESTERN PLANTS.—Prof. F. L. Harvey, of Fayetteville, Ark., has sent a list of plants that were collected upon a recent trip from Fayetteville to Neosho, Missouri. The list numbers about 120 species, most of them such as are common farther north and east. Of course, introduced species go wherever man goes, and such may be expected to appear in every list of plants, and the interest attached to them comes chiefly from the fact that they are spreading just as was expected. Species peculiar to any region often are unexpected species, and hence a list of indigenous plants is always interesting to look over. We have no space, of course, to reproduce Prof. Harvey's complete list, for bare lists make dry reading at best, unless the reader is looking for exchanges. The mention of a few species, however, may be interesting. We note the following: Isopyrum biternatum, Corydalis crystallina, Arabis Ludoviciana, Scleria aurea, Viola tricolor, var. arvensis, Arenaria Pitcheri, Lathyrus pusillus, Astragalus distortus, A. Mexicanus, Zizia integerrima, Fedia radiata, F. longiflora, Androsace occidentalis, Collinsia violacea, Pentstemon tubiflorus, Amsonia Tabernæmontana, Trillium sessile, var. Nuttallii, Ranunculus sceleratus, Corydalis aurea, var. micrantha, Heuchera villosa.

NARCISSUS CANARIENSIS.—E. H. Krelage and Son, Nurserymen, of Haarlem, (Holland) send out a circular advertising the above species for sale. The circular consists principally of a description of the species taken from a work entitled "The Narcissus; its history and culture." It is the smallest flowered form in the whole group, the dried flowers being half an inch across. It is not in cultivation yet, the Royal Herbarium, Kew, containing but a solitary dried specimen. In the month of June the above firm received a consignment of bulbs and will fill orders that are immediately sent to them. As the plant is exceedingly scarce, even where it is found, it is hardly probable another opportunity of securing bulbs will be offered.