

dency to become "croppers" instead of continuous bloomers. So the present "shallow bench system" of annual growth is doubtless the most prudent. Twelve or fifteen years of experience have established it in favor, and it is fair to presume that the Pierson Company would not follow it were it not the best. But it is really saddening to one who loves flowers to see such magnificent rose bushes as these discarded ones are thrown upon a brush heap to be burned. They have small roots in proportion to their wealth of tops, it is true, but if cut back and set out in good soil in the open field as soon as taken from the benches, would still, very probably, produce for the next spring's garden planting bushes that would compare favorably with most of those sold as "three-year-old plants" by dealers, and would have the great advantage of being unquestionably "true to name." Paul Pierson proposes to try the experiment this season on a sufficient scale to determine the practicability of the idea.

SUPPLYING THE MARKETS.

The list of roses grown here is naturally headed by the matchless "American Beauties," which are too well known to require any description for identification. English growers have sneered at this rose—as they grew it—but that was simply another case of "Sour grapes," said the fox. None of them have ventured to do so when they have seen it as grown to perfection in its own country, but some have consoled themselves by affirming that it was no new American rose at all, but just the old "Madam Ferdinand Germain" French rose, though they had to admit it flourished better here than in Europe. The American story, however, is that the "American Beauty" is a happy accident, a prize caught by the Field Brothers, of Washington, who found it among a lot of seedlings, grown from seed and gathered out of the superb collection of remount roses in the Washington garden of the historian George Bancroft, which is said to be one of the finest in the United States. Evidently it is the result of a hybridization between a remount and a tea rose. No rose fluctuates more in the prices it commands, according to its perfection, than this, for its value is dependent largely upon the arbitrary prescriptions of fashion. At the very time last winter when absolutely perfect long-stemmed specimens sold readily for \$24 per dozen, others hardly discernibly smaller and no less fine in color or form, except that their stems were shorter, went begging for buyers at \$6 per dozen. Even when they are most abundant, their price fluctuates all the way from two cents to a dollar each, according to quality. The Pierson Company have about four thousand "American Beauty" plants on their benches all the time.

Next in popularity ranks the "Meteor" rose, of which enough has already been said. The best of all white roses for specially high class cultivation, in Mr. Pierson's opinion, is the "Kaiserin Augusta Victoria," introduced last year from Germany. It is creamy white, elegantly formed, with large, gracefully curving petals, and exquisitely fragrant of the distinctive "tea" perfume. Both as an outdoor summer bloomer and under glass it has great possibilities before it, and, from the florist's point of view, that it is a strong grower and prolific bloomer are decisive qualities in its favor. There are 2,500 plants of it on the Pierson benches. "Madam Caroline Testont" is a new French rose, large, of elegant shape and bright pink color, without a trace of magenta or carmine—much like the beautiful old "La France," but brighter than it. Unhappily, "La France" has so far deteriorated that professional growers of fine roses have almost altogether discarded it. The number of "Testont" plants cultivated in these greenhouses at present is only 2,500. "Bridesmaid"—an improved Catherine Mermet—is another new favorite to which scant justice has thus far been done, through its misfortune in coming upon the American market upon the heels of the "Waban," which had also been offered as "an improved Mermet." The "Waban" was a failure, but the "Bridesmaid" is really an improvement. The "Mermet" was a natural hygrometer of extreme delicacy, and was wont to cause boundless exasperation to florists by turning from its natural deep pink tint to a nasty yellowish white whenever the atmosphere about it became moist. If the "Bridesmaid" is more constant to her color, the tentative thousand plants on the Pierson benches this season will doubtless be greatly increased next year. "Madam Cusin" is an old rose, but one of the best when well grown, and a favorite here. The difficulty experienced by growers generally in bringing it to perfection prevents its becoming common, but its desirable qualities will always make it profitable for those who understand its culture, as not more than half a dozen rose culturists about New York do. The Pierson Company carry 2,000 plants of it. The "Cusin" is a deliciously fragrant large rose, deep pink at the edges of the petals and shading down to white at their base. Like the "Beauty" and "Meteor," it is not so good as a bud as when partly opened. The "Bride," another favorite in this establishment, is an old standard rose, of a snowier white than the "Kaiserin," and larger than "Niphetos," which seems to be growing rare. "Perle de Jardin" is the best yellow rose we now have for culture under glass. It is a more continuous bloomer than "Marechal Niel," which was a "cropper," has a stiffer stem, and—except that its buds sometimes turn out "bull heads," as a peculiar sort of imperfect development is technically styled—is easier to grow, but its color, form and fragrance are all inferior to the glorious old golden "Niel." About a thousand plants of the old "Wootton," a good crimson rose, are grown here, just for variety, but it is not regarded as a feature.

The work of harvesting the roses goes on all day long, though certain varieties have pretty narrowly defined time limits, in which their flowers attain highest perfection. The "American Beauties," for instance, open at sunrise, and in two or three hours attain a point beyond which they will not expand until the sun again rises. In winter they are not cut before 9 or 10 o'clock in the forenoon, but in summer they must be gathered before 7 to have them at their best. No two varieties act alike in the matter of opening. Some must be watched so closely to catch the exact time when they are most perfect that half an hour will make all the difference possible in their market value, while others, like "Madam Cusin," may be left on the bush all day and be good equally at any hour. All as

soon as cut are carried down into a cellar and stored in a chamber which is kept at a temperature of 40 degrees. If sent out at once they would be wilted and their beauty destroyed before they could be brought to New York—an hour's run by rail; but after a night in that chilly air they can be relied upon to arrive in good condition at the end of twenty-four hours' travel. Every morning the harvest of the day before is sent down to New York on the seven o'clock train—excepting such special orders as have to be filled for other cities. The bulk of the product comes here and is eagerly competed for by commission dealers, who distribute it among the retail florists at the most widely and wildly fluctuating prices, dependent upon the supply in the market, the weather, the quality of the flowers and various other conditions. What the florists do not dispose of to their customers on the day of receipt the next morning pass into the hands of the Greeks, who vend them in bunches on the sidewalks for the best prices they can get from those who do not detect the difference between fresh and stale stock. And that difference is not so readily apparent as might be imagined. The flowers still are big, bright, stand pretty firmly together and their foliage looks vivid, but in a few hours more they will suddenly collapse.

Fifteen years ago a very large proportion of the roses used in New York were supplied by Boston growers. Now the trade is all the other way. Boston gets her finest roses from New York, and they are even sent regularly from here as far away as Cleveland.

PASSIFLORA MANICATA.

To a person from the Eastern States visiting for the first time the gardens of Santa Barbara, California, no other plant appears more striking and remarkable than the red-flowered passion vine, which may be often seen climbing into the tops of the tallest Eucalypti—that is, to the height of fully a hundred feet—or draping arbors and outbuildings with masses of its dark green foliage thickly studded in the spring with the deep scarlet flowers.

This magnificent plant is the *Passiflora manicata* of botanists, and a native of Peru, where it was discovered



PASSIFLORA MANICATA.

by Humboldt nearly a century ago, and of the Andes of Ecuador and New Granada. More than fifty years ago it was introduced into the gardens of Europe by the German collector Hartweg, who found it growing in hedges in the neighborhood of the city of Loxa.

Difficult to manage and shy of displaying its beautiful flowers in northern greenhouses, *Passiflora manicata* long ago made itself at home in the gardens of the Riviera, as it has in those of Santa Barbara, where it grows with astonishing vigor and rapidity, although individual plants are inclined to be short lived—a matter of comparatively little importance, perhaps, as seeds are produced in profusion and young plants grow so fast that at the end of two or three years they have usually outgrown their quarters.

Passiflora manicata produces nearly terete branches clothed, like the petioles, the under surface of the leaves, the stipules, bracts and exterior of the perianth, with soft pale pubescence. The leaves are thick and firm, three lobed to about the middle, finely serrate, dark green on the upper and pale on the lower surface, and are borne on stout petioles an inch in length, and marked with three or four dark glands; the stipules are an inch in diameter, ovate, deeply toothed, concave and clasping. The rigid peduncles are about two inches long, raising the flowers well above the foliage. The bracts at the base of the flower are ovate, acute, serrate, membranaceous and free or united from the base upward to the middle. The tube of the flower is about half an inch long, and inflated and ten lobed at the base; the limb is three to four inches in diameter, bright scarlet, with a double crown, the outer at the mouth of the tube composed of numerous rows of dark blue hairs, the inner at the top of the inflated base of the perianth. The fruit is egg shaped, about an inch and a half long, deep yellow green, and hangs on a slender stipe; it is covered with a thick skin and contains numerous large seeds surrounded by thin watery pulp.

A flowering branch and a fruit of *Passiflora manicata* is reproduced from a drawing made by Mr. Faxon. The habit of the plant as it grows in California is displayed in the case of a young specimen covering an observatory in the garden of Mr. Hugh D. Vail, one of the pioneers of Santa Barbara horticulture.

The manner in which *Passiflora manicata* reached

California appears to be unknown, but whoever it was who first had the happy inspiration of planting it there certainly deserves well of the State.—*Garden and Forest.*

A CHAT ON ORCHIDS.

By Mrs. N. PIKE.

Of late years great attention has been paid to the growth of orchidaceous plants, and as a natural consequence they have become fashionable with those who have well filled purses. It really needs them, for, whether as ornaments for a conservatory or as cut flowers, their price is higher than ordinary ones. No wonder that all flower lovers are attracted when our florists mass together the rare and curious productions of this singular order, and display them to the public. Flora must have been in her happiest yet most versatile mood when she combined such an odd mixture of beauty and grotesqueness.

Look at the tortuous stems and roots, the varied leafage, and the brilliance or insignificance of their blossoms. In some are blended the most exquisite colors, the tenderest shades of pinks or yellows, with a sudden dash of the richest crimson or purple velvet. In others the flowers are inconspicuous, yet are they noticeable for their leaves; and again some greet you with perfumes from "Araby the Blest," while there are those insupportable from their fetid odor.

Not content with her own realm, Dame Flora has invaded the animal kingdom for her models, as is well seen in the imitation of a dove in the "Holy Ghost" flower or in the butterfly orchid. Instead of confining them to earth, she has placed her epiphytal or true orchids as parasites on living trees, whence they fling out their wreaths of fragrance, or they close with a beauteous shroud the gradual decay of her forest giants as they lie prone in the dank depths of tropical woods. Nor has she been sparing of her treasures. With the exception of regions where extreme cold or dryness reigns, orchids are found the world over. They grow in all temperate climes, as, for instance, our own Northern States, but more especially do they love the humid, steaming forests of Mexico, Brazil, Madagascar, etc. Few are of any use economically save the vanilla, but are of that other greatest use,

"To minister delight to man,
To beautify the earth."
"To comfort man, to whisper hope."

It is well known that most orchids can only be grown at all in hothouses where the temperature and soil can alone be made to resemble that of their native homes, and it is generally supposed that all others must have a greenhouse at least. I would suggest to my flower-loving sisters that there are many, not the gorgeous blooms of the tropics, but others of much interest to amateurs, that can be grown in a house that has the ordinary temperature of 60 or 70 degrees. There are *Odontoglossums* and *Oncidiums*, especially the papilio or butterfly orchid, which thrive with much less care than is often bestowed in winter on a rose or fuchsia that gives most unsatisfactory results. Have them well arranged by a florist, and you may bring to your homes denizens of far-off lands; they only want care and patience to reward you.

Then in a garden there are many of our lovely so-called orchids that can be transplanted from their marshy beds if you only follow Nature's own methods of growth. Take up your plant in a good clump of the fibrous earth they revel in, plant in a shady spot, say among ferns and wild flowers, and never let the roots get thoroughly dry. In winter again go to Nature and see how she cares for them. Mulch them with dead leaves, but never let manure be put over them, or they will be a dead failure and rot out. I speak from sad experience, for I lost a number by a gardener smothering them with manure from a stable near by.*

Habenarias, the curious *Cypripediums*, or ladies' slippers, *Spiranthes*, *Pogonias*, and many others will succeed in a "wild garden." Where you have room to devote a spot to one it will well repay you, believe me. "All labor hath profit," and truly nothing like a garden yields so large an interest in health and pleasure. Care for your pets yourself, for they will never thrive unless you love them enough to treat them as Eva did Topsy, instead of leaving them to the precise but harsh rule of "Miss Feely," alias the hired man. Never forget, when you allow your flower beds to be invaded, the advice of the farmer: "Digging is hard work, let Pat do it, but—it will pay to sit on the fence and watch Pat dig;" and especially is this true where your choice flowers are concerned.

While speaking of these interesting plants, it will not be out of place, I hope, to say a few words about an orchid show I attended in New York a short time since. Those who did not or could not go lost a great treat. It was truly a tropical scene, and much of it took me back to the time when I wandered in the forests of the isles of the Indian Ocean in search of ferns and orchids. Wreaths of greenery ornamented the whole room, and pendant were numerous baskets filled with *Nepenthes*, their curious little pitchers hanging low down. Every table had a palm in its center, fan, sago, or the rarer *Chamærops*, with orchids creeping up their rugged stems. One arrangement gave a peculiar charm to the place. The orchids were all embedded in masses of tender green *Adiantums*, and their delicate colors were enhanced by their surroundings. The smaller ones appeared as if they sprang from the graceful ferns instead of their own twisted stems.

To adequately describe those rare blooms would fill columns of space, but some were worthy of special notice from even a casual observer. The grand *Cattleyas*, from purest white to tender pinks and lilacs, with their diaphanous petals and deeply fringed, velvet lips, were in abundance. The orange *Lolias*, the fleshy, creamy *Lycaste Shinnerei*, the yellow *Oncidiums* and varied *Cypripediums*, with slippers of hues fitting for an Odalique or Titania, and so many others I have neither time nor space to enumerate, made up a delightful picture.

A great deal is said of the value of museums and all collections of objects of natural history, and it is true

* I should state that the clump of fibrous earth brought from the woods to the garden degenerates after the second year's blooming, so care must be taken to renew it. Carefully break up the old mass, giving especial attention not to touch the roots, then add a quantity of fresh fibrous matter from the woods and pack it well round them. By this method our common orchids may be kept in a garden for years.

in the widest sense. To the general public, especially those who have rare holidays, but have the wish to learn and appreciation of all they see, they are both recreation and profit. Forms are brought before them they are never likely to see in the flesh; but the life-like work of the taxidermist places them actually before their delighted eyes. To the student, who goes deeper into the nature of all created things, not enough can be said in praise of such institutions, and it is a shame that any large city should be without them. Yet they are only dead, inanimate forms, however great may be the semblance of life given them.

Here let me say a word in favor of the flower shows I am glad to see increasing in frequency. Take this orchid show I speak of, for instance. There massed together are plants, living, sentient beings, collected at vast expense of toil and money. They are placed before us in all their tropical beauty, growing as luxuriantly as in their homes in the depths of Brazilian or Sumatran forests.

The true botanist, who has spent midnight oil in poring over scientific works on botany, revels in the sight of these plants of such varied and curious organization, and his eyes at last realize what his brain had conceived before; and I fear many a one longs to use his dissecting scissors to unravel some unlooked-for complications in their singular construction. To the real lover of flowers for their own sake, independently of science, it is a rare treat; and one can quietly contemplate such a wealth of floral loveliness inhaling their fragrance and taking in every feature of the display with intense delight.

Equally in a show of roses and other common flowers, it gives food for thought and pleasure to see art and nature hand in hand. By all means give us as many flower shows as possible, but let the price of admission be within the reach of the slender purse as well as the full one.

FOOTPRINTS OF VERTEBRATES IN THE COAL MEASURES OF KANSAS.

By O. C. MARSH.

THE Museum of Yale University contains a small collection of footprints of much interest, which were found in 1873, in the middle coal measures, near Osage, in southeastern Kansas. This collection is part of a larger series of specimens obtained at the locality by the late Prof. B. F. Mudge, who published a short notice of the discovery, which was subsequently

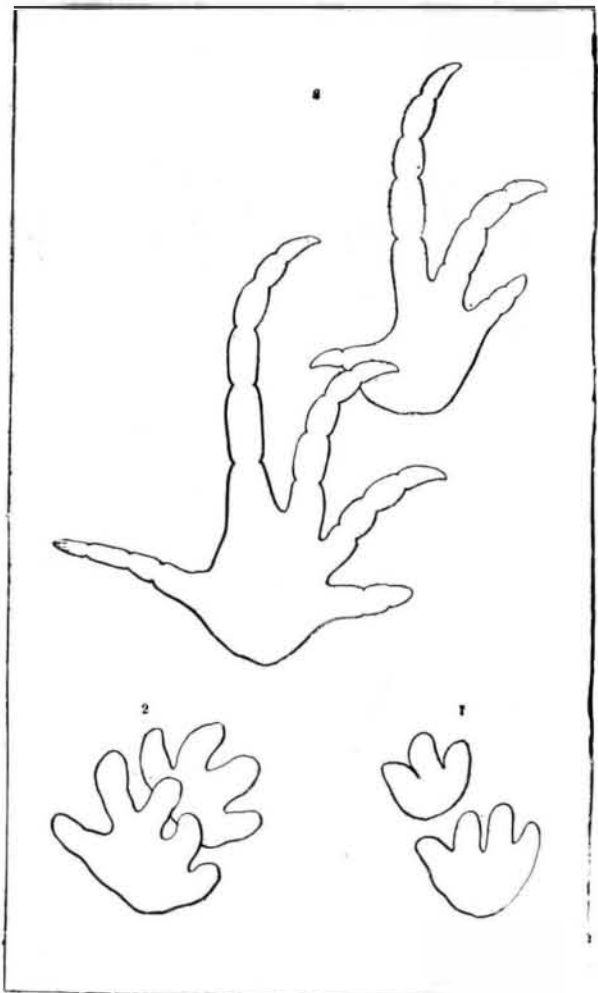


FIG. 1.—Outline of left fore and hind footprints of *Nanopus caudatus*.
FIG. 2.—Outline of left fore and hind footprints of *Limnopis vagus*.
FIG. 3.—Diagram of the left fore and hind footprints of *Dromopus agilis*.

PLATE II.—FOOTPRINTS FROM KANSAS COAL MEASURES.

copied in this *Journal* (vol. vi., p. 228, 1873). The writer examined this entire collection at Manhattan, Kansas, in the autumn of 1873, and secured it for the Yale Museum. The more important specimens were then sent to New Haven, and tracings and notes were taken of the others, which were left to be forwarded later. A careful re-examination of these footprints has been recently made by the writer, and the main results are given in the present article.

The impressions are well preserved in a calcareous shale, which separates readily into thin slabs, each representing a surface of the beach at the time the footprints were made upon it. A few shells in the shale are sufficient to prove that the formation is marine. Trails of annelids, and perhaps of other invertebrates, are seen on some of the surfaces. The footprints of vertebrate animals, however, are of paramount importance, and the large number and variety of these here recorded on a single surface, if they could be rightly interpreted, would form an interesting chapter of land vertebrate life in the carboniferous, about which so little is at present known.

On Plate I., accompanying the present article, five distinct series of footprints are shown, each one-twelfth natural size. All were found on essentially the same surface, and at one locality. The five different animals they represent were thus contemporaries, and indicate a wealth of air-breathing, land vertebrate life at this period hitherto unsuspected.

With these impressions were still others, made either by animals nearly allied or by the same animals under different circumstances. These need not be further noticed in this connection, but they serve to emphasize the diversity of life at this point. The typical series are briefly described below.

Nanopus caudatus, gen. et sp. nov.

The first series represented on Plate I., figure 1, indicates the smallest animal that here left a distinct series of footprints, and the only one in which an imprint made by the tail was preserved. This small quadruped had evidently but three functional toes on the fore feet and four on those behind. The fore feet were considerably smaller than the hind feet. The impressions made by the latter are nearly all separate from the anterior footprints, although at times slightly over-

lapped about the same as those above described, although the animals differed much in size. They were probably both amphibians, and may have been nearly allied.

Dromopus agilis, gen. et sp. nov.

The third series of footprints shown on Plate I., figure 3, is of special interest, and indicates an animal very distinct from the two already described. On Plate II., figure 3, an outline impression is given, natural size, of one double footmark of this series, made by the fore and hind feet of the left side. This diagram represents the impression of the phalanges sufficiently in detail to indicate their number and general form. A striking feature in the fore and hind feet of this animal was the long, slender digits, terminated by sharp claws. Another point of interest, as recorded in the footprints, is that the animal in walking swung the hind feet outward, and so near the ground that the ends of the longer toes sometimes made trails in the mud, marking accurately the sweep of the foot. This would seem to indicate a comparatively short hind leg, rather than the long, slender one which the footmarks themselves naturally suggest.

The animal that made these interesting footprints

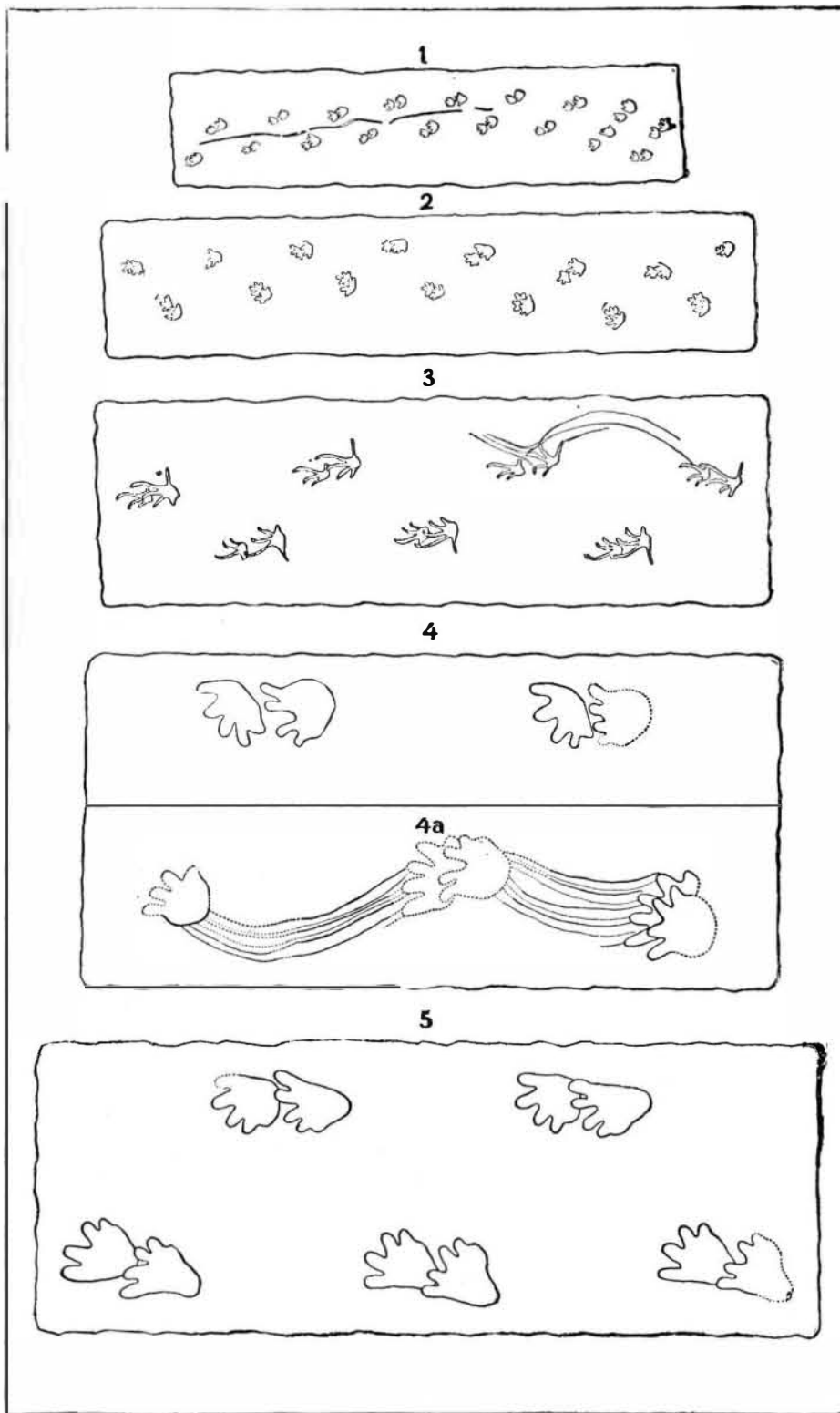


FIG. 1.—Series of footprints of *Nanopus caudatus*, Marsh; showing, also, impression made by the tail.
FIG. 2.—Series of footprints of *Limnopis vagus*, Marsh.
FIG. 3.—Series of footprints of *Dromopus agilis*, Marsh; showing trails made by the toes.

FIG. 4.—Two pairs of footprints of *Allopis littoralis*, Marsh; right side.
FIG. 4a.—Footprints of same; showing trails made by the toes; left side.
FIG. 5.—Series of footprints of *Baropus lentus*, Marsh.
All the figures are one-twelfth natural size.

PLATE I.—FOOTPRINTS FROM KANSAS COAL MEASURES. (One-twelfth natural size.)

lapping them. One fore and one hind footprint of this series are represented, natural size, on Plate II., figure 1.

The nature of the animal indicated by these impressions can at present be a matter of conjecture only, but the probabilities are in favor of its reference to the amphibians rather than to the true reptilia. As it is evidently distinct from anything hitherto described, the above name is proposed for it.

Limnopis vagus, gen. et sp. nov.

In figure 2, Plate I., a second series of footprints is represented, somewhat larger than those above described, and evidently made by a very different animal. A fore and hind footprint of this series are shown, natural size, in figure 2, Plate II. The front feet had four functional toes, while those behind had five, all well developed. The impressions of the hind feet, as a rule, overlap those of the corresponding fore feet. No indications of a tail can be detected. In length of stride, and in the distance between the foot steps of the right and left sides, the present series is proportion-

was probably a lacertilian rather than an amphibian, but there is also a possibility that it was a primitive dinosaur.

Allopis littoralis, gen. et sp. nov.

Besides the footprints above described, which pertain to animals of comparatively small size, there are several other series in this collection made by very large animals, which were probably all labyrinthodonts. These tracks were made on the same beach, and at about the same time as the small footprints, but not all under the same circumstances. The largest animal thus represented appears to have walked on one part of the beach that was quite firm, leaving very shallow footprints, and again to have traversed another part, quite near the first, but slightly covered with water, or at all events so soft that deep impressions were made by the feet, while the toes of the hind feet also left deep trails as they swung outward at each step. On Plate I., figures 4 and 4a, these two kinds of footprints are represented. They show the stride of the animal, and, as put together, also denote the width be-