opinion of paleontologists that the study of tracks "leads nowhere," and "are so blind." To a true paleophilist fossil footprints are notes from the life of the animals of the past and give us some clue, not otherwise obtainable, of their daily life. The evidence is slight, it is true, but none the less the study of footprints aids us in our understanding of paleobiology, which we could not otherwise have.

Feeling thus as I do about the study of footprints, it was a source of delight to find here on the Pacific Coast other paleophilists who felt the same about the matter, and they possessed a collection of fossil footprints from the Red Beds of Texas, which I suggested would be well worth studying. The collection was then placed at my disposal. The tracks all represent small animals of types which are unknown from skeletal material. Williston saw some of the tracks in 1909 and suggested they might represent salamanders. During the twenty years which have elapsed since Williston published his short note, small collections of these objects have accumulated in several museums, and the time seems propitious to gain an insight into the small animals of the famed Texas Red Beds, by a study and description of this assemblage of new materials. The several hundred tracks represent a variety of animals, all of which are new to science.

We shall accept it as a well established matter that the usual rules of taxonomy apply to ichnological objects. This is a commonly accepted opinion of paleontologists and needs no defense. There are several new species, of different genera, represented in the present assemblage which it is planned to define as well as may be and place the matter where it can be at the disposal of other workers. The majority of the tracks measure under 15 mm. in length, the imprints looking amazingly like the foot-structure of the Microsauria whose anatomy I so delighted to study ten years and more ago. In addition to the vertebrate impressions, and making the study more fascinating still, are the trails of invertebrates and weather indications.

It has been more than a century since Pliny Moody pointed out to his friends the footprints of *Noah's Raven* on the red slab which formed a doorstep to his home in Massachusetts, and it is my purpose to regard this study of the Ichnology of Texas as a centennial celebration of man's study of the trails of his predecessors. It is my hope to see and study all materials of this nature and I hope that those who read this note and know of footprint assemblages from Texas will be so courteous as to let me know.

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DISCOVERY OF FOSSIL TRACKS ON THE NORTH RIM OF THE GRAND CANYON

FOSSIL tracks of quadrupedal animals were first discovered in the rocks of the Grand Canyon of the Colorado in 1915, but the abundance of their occurrence and their great variety of kind has only recently been made known.[1] During the past three years investigations carried on by the senior author show the presence of no less than 28 genera and 36 species of fossil ichnites. These represent three distinct faunas that named in descending order occur in the Coconino (Permian), Hermit (Permian) and Supai (Pennsylvanian?) formations. All of the specimens on which the above-mentioned determinations are based were obtained entirely from the south side of the canyon, and it is, therefore, of interest to find that fossil footprints also occur on the north side. Mr. Sturdevant, with the assistance of Mr. Charles Nash, made a special search for tracks on the north rim and on December 9, 1927, and was rewarded by finding well-preserved footprints in both the Coconino and Supai formations.

When collections have been made, it will be a matter of added interest to learn whether the tracks occur in the same horizons and also whether the same genera and species are to be found on both sides of the canyon, which are separated by a distance in an air line of fourteen or more miles.

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A CORM ROT OF GLADIOLUS CAUSED BY A PENICILLIUM

THE diseased corms have reddish brown lesions, firm but not hard, sunken, usually irregular in size and shape and without definite margins. The dark brown, moderately porous rot invades the corm tissues rather rapidly at temperatures between 12 and 23° C., eventually destroying the corm. At temperatures above 20° C. there is but scanty development of the blue-green conidia. Numerous sclerotia appear both on the surface and in the interior of the attacked corms.

The pathogenicity of the fungus has been proved by inoculation experiments and the connection of the sclerotia with the Penicillium has been definitely established.

[1] Gilmore, C. W., *Smith. Miscel. Coll.*, Vol. 77, No. 9 1926, pp. 1–41, 12 plates; *Smith. Miscel. Coll.*, Vol. 80, No. 3, 1927, pp. 1–78, 21 plates; *Smith. Miscel. Coll.*, Vol. 8, No. 8, 1928, pp. 1–16, 5 plates.

Both growing and stored corms become infected through even slight wounds but the fungus seems unable to penetrate the uninjured epidermis of corms.

Technical Description: Penicillium gladioli n. sp.

When grown at 20–24° C. on gladiolus corms or on favorable media such as Czapek's solution agar, or potato dextrose agar, the conidiophores are 50 μ to 2 mm. long by 2 to 3.6 μ in diameter; penicillus consisting of the main axis of the conidiophore with or without one or two branches, bearing few metulae 10–12 μ long and verticils of few sterigmata 12 to 14 by 1.5 to 2 μ with tapering rather than acute points, and conidia elliptical-fusiform, smooth, hyaline, 2.8 to 3.6 by 2.5 to 3 μ, adhering in long chains. When grown at 10 to 16° C. the conidiophores tend to be longer and coarser, with walls pitted or roughened, often forming conspicuous tufts, fascicles or complex branching coremia.

The sclerotia are 140 to 540 μ in diameter; cream to light pinkish tan, in age becoming pale brown or tan; smooth and composed of thick-walled cells 8 to 12 μ in diameter; retaining their vitality for several months.

On Czapek's agar the reverse color of the fungus growth is light pinkish cinnamon; drops of pale orange yellow fluid are more or less conspicuous on the mycelium; odor none.

The fungus described above has been identified from corms grown in such widely separated regions as Holland, New Mexico, Canada, Kansas and New York.

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UNDULANT FEVER IN AMERICA

IN 1906 Craig[1] reported the first case of Malta (Undulant) fever originating in the United States. At the close of his paper he states: "(1) The probability of much wider distribution of Malta fever, even in temperate climates, than is generally supposed, and therefore the great importance of applying the serum test in all undetermined cases of fever in all regions. (2) That there are no pathognomonic symptoms of Malta fever. All the symptoms presented may occur in many other infections, and the cases are very few in which a diagnosis can be made without the aid of the serum reaction." The increasing number of cases reported since that time shows that Craig's prediction was correct.

The observation that the causal organism of Malta fever (*Alcaligenes melitensis*) and contagious abortion (*Alcaligenes abortus*) in cattle are closely related in their cultural, biochemic, serologic and pathogenic characteristics was reported by Miss Evans[2] and has been confirmed by numerous investigators. In addition to goats and cattle, hogs and horses are known to harbor the microorganisms.[3]

Of 35 strains studied by Miss Evans[3] 33 were of the abortus or melitensis A varieties. One strain which did not conform to the two common varieties is serologically closely related to paramelitensis of Négre and Raynoud.[4] These authors designated as paramelitensis in their morphologic, cultural and biochemic features, but failed to agglutinate or agglutinated slightly in melitensis serum. Absorption of agglutinins by paramelitensis from melitensis serum was only partial.

The writer has recently isolated a microorganism from the blood of a patient ill with a wave-like type of fever of long duration; with swelling and painful joints and sweats. Blood examination showed secondary anaemia, leucopenia and a marked increase in the percentage of the lymphocytes.

This microorganism was culturally, morphologically and biochemically melitensis, but it agglutinated in melitensis serum in the lower dilutions only, and it did not absorb very much of the agglutinins from the serum. Spontaneous agglutination in salt solution was marked. Perhaps this variety of melitensis is more widely spread than was formerly believed.

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ARE SALT SOLUTIONS MUSICAL?

TESTS in our laboratory with magnesium sulphate, salt, ammonium chloride and sugar convinced us that the change in pitch described by Dr. C. D. Spivak (SCIENCE, October 21, 1927) is due almost entirely to a change in volume of the solution with a consequent change in the length of the resonant column in our closed tube (air column over liquid in tumbler, beaker or graduate). Thus when magnesium sulphate is added to water the first increase in volume is equal to that of the dry magnesium sulphate; but as solution progresses, the volume of solution plus solid diminishes with a corresponding change in pitch. Solids on the bottom of the container produce a deadening of sound. The addition of sand deadened the sound and caused a change in pitch equal to that caused by the addition of an equal volume of water.

I wonder if Dr. Spivak has taken these points into

[1] Craig, Chas. F., *Internat. Clinics*, 15 ser., 4, 115, 1906.

[2] Evans, Alice C., *Jour. Inf. Dis.*, 22, 580, 1918.

[3] Evans, Alice C., *Hygienic Lab. Bull.* no. 143, 1925.

[4] Négre, L. and Raynaud, M., *Compt. rend. Soc. de biol.* Paris, 72, 791, 1912.