(3) In *Dromatherium* the molar pattern is variable, the first two molars consisting essentially of a single high cusp with very minor anterior and posterior accessory cusps, asymmetrically placed, and the succeeding molars consisting essentially of a high anterior cusp with a single posterior accessory cusp of varying size. The variability and asymmetry are quite unlike the most nearly similar mammals (the triconodonts) and the pattern of the posterior molars is entirely unlike anything known among mammals but very closely similar in ground plan to that of a number of mammal-like reptiles, such as *Cynosuchus* and *Glochinodon*. The molar pattern of *Microconodon* is more mammalian in aspect and, except for its asymmetry, somewhat resembles that of the most primitive triconodonts. There are cynodonts, however, such as *Ictidopsis*, which resemble the triconodonts more closely than does *Microconodon* and there are other cynodonts, such as the well-known *Cynognathus*, the molar pattern of which is much closer to that of *Microconodon* than is that of any known mammal.

In conclusion, on the basis of the present material it is not possible to settle the systematic position of *Dromatherium* and *Microconodon* beyond all doubt. It is possible, however, to say that many of the characters which they exhibit resemble the cynodonts much more than they do any known mammals, that none of the characters which they exhibit resemble any known mammals more than they do the cynodonts, and that none of the characters which they exhibit involve any difficulty in their reference to the Cynodontia. It is, therefore, not justified by our present knowledge to consider *Dromatherium* and *Microconodon* as mammals and they should, at least until further material is forthcoming, be referred to the Reptilia. In the latter class they certainly must be placed in the group Cynodontia, under which each of them must probably be considered the type of a distinct family in view of the great differences between them in tooth pattern and jaw form. This does not, of course, deprive these forms of interest with regard to the origin of mammals and they were probably quite near the ancestry of the latter, although probably not more so than any of the other known small cynodonts. That they were not directly ancestral to any known mammals is certain.

Through the cooperation of Professors Chadwick, Brinsmade and McElfresh, of Williams College, an interesting new point of technique was developed which may be of use to some other students of small and obscure forms. In studying *Dromatherium*, the better preserved but more obscure specimen of the two, great difficulty was experienced in observing the boundary between the black teeth and equally black matrix (coal). After experimenting with various ray filters and color screens, it was found that by using the unmodified light from a small laboratory mercury arc in quartz very remarkable results were obtained. This light, rich in ultra-violet, set up a bluish fluorescence in the teeth which, while faint, was sufficient to distinguish them quite clearly from the unmodified black of the coal. Care must, of course, be taken to shield the eyes from the direct radiation of the arc, but the lenses of the compound binocular microscope through which, in this case, the specimen is viewed remove the harmful rays.

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VIABILITY OF DESICCATED OR GLYCERINATED CELLS OF A CHICKEN SARCOMA

IT is a matter of general knowledge that some microorganisms are resistant to drying and to the action of glycerin, and the revival of desiccated lower forms of animal life is not a rare phenomenon in experimental biology. It has not been suspected that the cells of as high an animal as the chicken are resistant to these processes.

In recent experiments I was able to show that the cells of the Rous chicken sarcoma No. 1 withstand the processes of desiccation and of glycerination. I am indebted to Dr. James B. Murphy, of the Rockefeller Institute for Medical Research, New York, for a quantity of the desiccated tissue of the chicken sarcoma. Some of my experiments were carried out with this desiccate, while others were based on new tumor material obtained in this laboratory by injecting the desiccate into chickens. The desiccate sent to me by Dr. Murphy was prepared October 8, 1925, and was used in my experiments four months later (the early part of February, 1926). Material prepared in this laboratory was dried in the desiccator over calcium chloride in a partial vacuum, and was kept in sealed glass tubes for two to six weeks before it was used.

A small portion of the dried and pulverized material, proved to be capable of producing sarcoma by injecting into chickens, was ground up into a viscous suspension in a mortar with the addition of an adequate quantity of sterile physiological salt solution. This suspension was examined microscopically with the addition of an appropriate amount of trypan blue dissolved in normal salt solution. It showed a large number of cells with the morphological appearance of living cells. The nuclei of these cells were very slightly bluish, and were not deep blue as in the case of dead cells, the nuclear permeability of dead cells to certain dyes being a well-known fact. Stained smears made of this suspension also showed numerous live-looking cells with well-stained nuclei and cyto-

plasm free from signs of degeneration. When such a suspension is incubated at 37° C for two or three hours, the cells, instead of disintegrating, continue to appear normal. When placed in a drop of chicken plasma, according to the established method, and kept at 37° C for a few hours, the cells are seen to migrate out actively toward the periphery of the culture media.

If the suspension is deprived of its power to produce sarcoma by heating or by treatment with alcohol, smears no longer show the normal-looking cells. The cells after these treatments assume the morphological appearance of death, showing marked pycnosis, karyorrhexix, etc. It was also noted that desiccated mouse or rat tumor cells are completely necrotic when suspended in salt solution and examined microscopically.

The above facts, repeatedly observed in a large series of experiments, may be regarded as proving that the desiccated cells of the Rous sarcoma No. 1 are not dead but are capable of revival.

The process of glycerination was also believed to be fatal to the cells of the chicken sarcoma, as it is to mammalian tumor cells. In repeated experiments I have found that this process is inadequate to rule out the viability of sarcoma cells. Briefly, these experiments were carried out as follows:

An emulsion of fresh sarcoma cells, strained through a fine wire mesh and ground fine in a mortar, was placed in 50 per cent. glycerin and kept in the ice box for one week. Cells were then washed in normal salt solution and examined microscopically. The majority of the cells had an entirely normal appearance, and their nuclei were impermeable to trypan blue. In the plasma media these cells showed the phenomenon of migration characteristic of the living cells.

These observations open up the question as to the existence of the so-called causative agent in avian sarcomas. It will be remembered that three methods have been used to demonstrate the existence of the agent which is separable from sarcoma cells, namely, filtration, desiccation and glycerination. It has been taken for granted that these processes either completely eliminated or killed the cells, leaving the causative agent viable. Judging from the fact that mammalian neoplasms have been occasionally transmitted by the Berkefeld filtrates, it is doubtful if the filtrability alone can be accepted as conclusive evidence. If desiccation or glycerination does not kill the sarcoma cells, as my experiments indicate, the question of the causative agent, separable from the cells, would seem to require a careful reconsideration. However, it is not my purpose here to discuss the existence or nonexistence of the hypothetical agent. Suffice it to say that the remarkable viability of the sarcoma cells demonstrated in the above experiments should be of significance in the study of the transmissibility and etiology of avian new growths.

Fuller accounts of experiments referred to in this note are due to appear in the March, 1926, issue of *Gann*, Vol. XX, No. 1, the journal of the Japanese Society for Cancer Research.

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THE MAGNETIC PROPERTIES OF ATOMS

IN view of the great interest attaching to recent work by Gerlach and Stern[1] on the deflection of a beam of atomic rays in a powerful inhomogenous magnetic field it seemed desirable to repeat some of this work by way of confirmation and to extend the work to other elements and molecules if possible. A Du Bois electromagnet capable of giving a normal field strength of 20,000 gauss was fitted with a wedge-shaped pole piece near which a value for $\frac{dH}{dS}$ of about $2\times10^5 \frac{\text{gauss}}{\text{cm}}$ was obtained. No difficulty was experienced in confirming the results on silver. The atomic rays of silver were obtained by heating a silver-plated tungsten filament. This method was found to be much superior to the pot furnace used by Gerlach and Stern since the latter gives off such quantities of gas that a vacuum is difficult to obtain.

In order to produce a beam of atoms of the alkali metals, the metal was introduced by a combined process of distillation and filtration, gas free, into a bulb connected with the apparatus. Heat was applied to the bulb externally from an electric furnace. It was found that a deposit of sodium or potassium could be obtained on a glass plate at room temperature but in order to obtain a sharp image it was necessary to construct the apparatus so that the liquid air could be applied to the outside of the receiving plate. The alkali metal images could not be "developed" as were the silver images but they may be fixed so that they can be photographed by introducing hydrogen chloride gas into the apparatus.

With a beam of comparatively wide cross section (0.2 mm) a noticeable broadening of the image was obtained but no splitting. When the width of the slits producing the beam was reduced to 0.03 mm and the slits carefully adjusted with respect to the pole pieces distinct images of the divided beam were obtained for sodium and potassium. Under the microscope accurate measurements of the splitting can be made. The calculated magnetic moment is within 10 per cent. of the value of the Bohr magneton. The deflections for sodium and potassium are inversely as

[1] *Z. Physik.*, 8: 110 (1921) et. seq.