in which reports by Roth and others of mammal beds proved to be incorrect, and then southward into unmapped central Chubut. After much searching, the richest strike of the expedition was made here on December 5, 1933, in a large amphitheater known locally as the Rinconada de los Lopez. Work on this discovery continued until February 4, 1934, and after a period spent in carting and packing fossils and repairing damage done to the car by the extremely difficult traveling conditions, a short time was spent rechecking and adding to observations made by the first expedition south of Lake Colhué-Huapí. The field season was closed and the party moved to Comodoro Rivadavia on February 27. The collection was shipped by government tanker, and we proceeded to Buenos Aires by land, picking up the Trelew collection at that town and following the same route as in 1931.

After lengthy negotiations and with some difficulties which need not be detailed at this time, the second collection was also cleared and is now in New York.

In the course of the two Patagonian expeditions, the party traveled over 12,000 miles in the field and made a reconnaissance, from the view-point of its special aims, of an area of over 30,000 square miles. Detailed studies were made at twenty-five different localities. Fifty-four detailed geologic sections were measured, and many others sketched or estimated. Almost every known exposure of the early Tertiary in Patagonia was examined, including several hitherto unknown, and detailed observations on their stratigraphy and structural geology made. These stratigraphic results will considerably alter the present conception of the Cretaceous-Tertiary transition in South America. Aside from a series of rock samples from all the principal exposures and horizons and a few small miscellaneous collections, the Scarritt Collection consists of fossil vertebrates. Many fish, frogs, birds, crocodiles, turtles and snakes are included, giving a remarkably complete picture of the early Tertiary life of the region. Some of the members of these hitherto neglected or undiscovered groups prove to be of extraordinary interest and value. Mammals, the principal aim of the expeditions, are still better represented, with fine typical collections from all the known pre-Patagonian (*i.e.*, Paleocene through Oligocene) mammal-bearing formations, including the oldest, the Río Chico Formation, first recognized and defined by us, as well as the Casamayor, Musters, Deseado and Colhué-Huapí, from which, respectively, came the *Notostylus, Astraponotus, Pyrotherium* and *Colpodon* faunas of Ameghino. A number of new forms are included, but it is considered still more important that many relatively complete specimens were discovered of animals previously named on the basis of scraps and single teeth and hitherto more confusing than helpful.

Work on this great collection of data and specimens will not be completed for several years, but is being pushed as rapidly as possible. Twenty-one preliminary papers have been published, and several others are in preparation. A book, "Attending Marvels: a Patagonian Journal," gives a popular narrative of the first expedition. An extensive memoir on the stratigraphy and faunas of the Cretaceous-Tertiary transition and the Río Chico, Casamayor and Musters Formations is about one third completed. A shorter résumé and revision of the Roth Collection is completed and will be published by the Museo de La Plata. A detailed descriptive catalogue of the *Notostylops* and *Astraponotus* faunas in the Ameghino Collection is nearly completed and will be published by the Museo Argentino de Ciencias Naturales.

Aside from the completion of this research, future plans for the Scarritt Expedition include the extension of its collecting activities into other fields, and negotiations toward this end have already been started, but an announcement of definite plans would now be premature.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE OBSERVATION OF MITOSIS IN THE LIVING CELL IN AMOEBA PROTEUS

DURING the past few years *A. proteus* has been used in this laboratory as material for the study of cell division. It has proven excellent material, except that, due to the great number of granules, food vacuoles, etc., in the cell and the transparency of the nucleus at mitosis, direct observation of nuclear fission was impracticable. Recently the following method has been devised which permits mitosis to be quite readily followed in the living cell:

Two or three drops of hot .65 per cent. agar agar made up in saline[1] are placed on a thin microscope slide and allowed to set. Then a dividing amoeba, selected according to the criteria given by Chalkley and Daniel,[2] is placed on the agar in a small drop of culture fluid and immediatly covered with a cover glass. Fifteen mm square No. 1 is satisfactory. The cell is thus flattened but is not damaged, as the

[1] H. W. Chalkley, SCIENCE, 71: 442, 1930.
[2] H. W. Chalkley and George E. Daniel, *Physiol. Zool.*, 6: 592–619, 1933.

agar is soft enough to yield slightly and obviate damage. The nuclear changes during mitosis can then be observed under the microscope. A 2 mm oil immersion objective and 10^x compensating ocular are suitable. Under these conditions the following can be observed: The prophase nucleus appears as a spheroidal, usually slightly opalescent body, surrounded by a tenuous membrane and containing fine almost dust-like chromatin granules in active trembling motion. These granules gradually aggregate to form an annular plate. Generally this is formed in a plane normal to the surface of the slide. The nuclear membrane is still discernible at this stage. Following this the nucleus becomes flattened in the plane of the plate. Next there occurs a rapid radial shrinking of the plate, accompanied by disappearance of the membrane; almost simultaneously the plate splits in its plane, forming the daughter plates, which immediately separate and can be followed for a short time as they part. No spindle fibers can be seen, but their position is occupied by an opalescent or hyaline area into which no cytoplasmic granules intrude. By the time the daughter plates have separated for a distance of about their own diameter they show no granulation but appear as hyaline refractive disks. As a consequence of this, if it happens that division of the plate takes place in a plane other than that normal to the substrate this separation of the daughter plates is extremely hard to observe. As the plates reach the neighborhood of the cell membrane elongation of the cell begins and fine granulation is again visible in the plates and thin membranes can be seen at their surfaces. Before the cytoplasm of the two daughter cells has divided the new nuclei show definite granulation with active motion in their central portion. They possess also definite membranes with a layer of fine quiescent granulation just beneath.

The time relations of the mitotic process under these conditions are practically unchanged, as far as the nucleus is concerned; cytoplasmic fission, however, is greatly interfered with and in many cases is not completed.

At the completion of observation the amoebae are readily retrieved uninjured. If a drop of culture solution is placed with a pipette on the edge of the cover slip so that it flows beneath, the cover slip can be gently lifted from the agar without damaging the cell, which may then be transferred as desired by means of a pipette.

It is hoped that this simple method will be found of use in the study of mitosis in this and other related forms in which the granularity of the protoplasm has been a source of trouble.

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AN APPARATUS FOR COLORIMETRIC OXIDATION-REDUCTION STUDIES

THE apparatus consists of a B. and L. biological colorimeter modified so that the stationary side carries a metal cylindrical tube which fits closely over the plunger. It is kept in place on the metal at the top by 2 set screws. This tube has spring hooks at the bottom which serve to hold a detachable similar but shorter metal frame holding a cylindrical glass reaction container up to and in line with the plunger.

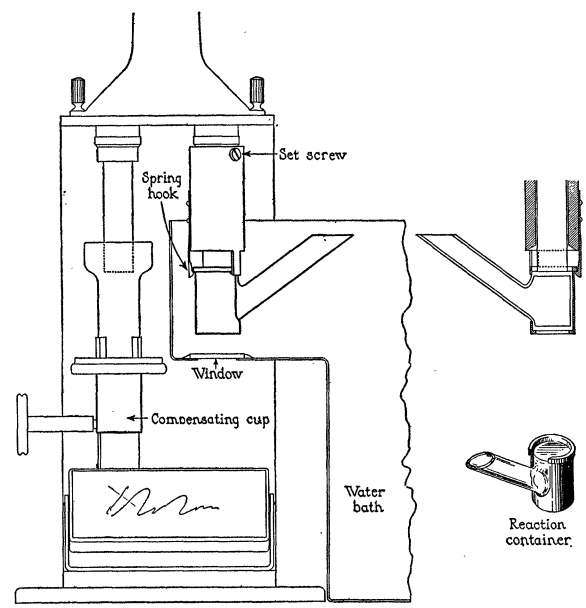

FIG. 1

The glass reaction container holds about 3 cc of fluid and is completely closed except for a side arm which comes off at an upward angle. Through this the reactants are added and the arrangements are made for exclusion of air (by evacuation or by an inert gas).

The reaction container is immersed into an extension and over a window set in the bottom of a specially designed constant temperature bath. The main body of the bath sits beside the colorimeter and does not block light reflected from the mirror which passes through the window.

The compensating cup (B. and L. 33.-27-31-01) may fulfil not only its usual function but it balances the water and glass window of the water bath.

The movable cup contains a standard solution of the dye which allows the fading curves to be followed as the reaction proceeds.

The flexibility of this simple compact arrangement with the fine control of end points makes the apparatus well adapted to dehydrogenation studies as well as to other reactions where the fading of an indicator is involved.

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