Study of the manifold properties of MR-1 virus is facilitated by the TPA procedure. Under investigation is the reisolation of this virus from nasal washings (*1*) of volunteers with colds produced by egg passage MR-1 or by human-to-human transfer of the disease. With the TPA procedure, it may be possible to isolate and study agents other than MR-1 virus, without the necessity of laborious human volunteer studies.

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Electron Microfossils

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There are a number of areas, particularly in the Gulf Coast, where oil wells are drilled through thick sections of shale having few or no individual and unique characteristics as far as petrology and the usual paleontological markers are concerned. It is therefore often difficult to locate the well in the geologic section, except very roughly, and this complicates correlations from one well to another. Electron microscopy was one of the several techniques investigated in this laboratory in attempts to differentiate between portions of these shales. It was thought that it might be possible to observe differences in the microstructure of the shales, or that very minute microfossils might exist which would be sufficiently distinct to serve as markers.

Samples of cuttings were collected at the shale shakers of several wells, principally in the Chocolate Bayou field, approximately 30 miles south of Houston, Texas. Most of these samples were from the Frio, a nonmarine Oligocene formation. This is a gray-green, fine-grained, micaceous shale containing a little bentonite. In one well, the Phillips Petroleum Company No. 1 Robnett, this formation was encountered at 8,920′ and extends down past the last sample taken at 12,583′. Samples in the range from approximately 10,000′ to 11,000′ were taken at three other wells in this field. Samples were taken also at two wells in Upshur County, Texas, about 230 miles north of the Chocolate Bayou field. These were from the Eagle Ford formation, from the basal Upper Cretaceous. In addition, samples were examined from the Black Band shale, an iron ore mined in eastern Ohio from the base of the Conemaugh formation, of Pennsylvanian age. Thus, three eras are represented altogether—Cenozoic, Mesozoic, and Paleozoic, in that order.

The material was crushed, and the portion that would pass a 200-mesh sieve was mixed with water in such proportions that the water was just cloudy, the actual amount being determined by experiment and later judged by eye. It was found that results were better if the suspensions were allowed to settle briefly so that the larger particles were removed.

A number of distinctive objects were found. It is difficult to determine anything about the origin of some of

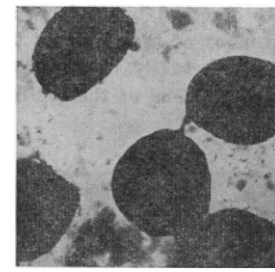

FIG. 1

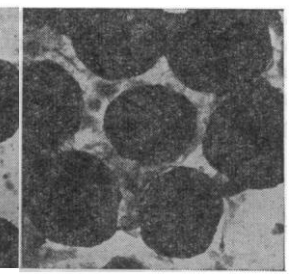

FIG. 2

them—whether they are plant, animal or mineral. The problem is complicated somewhat by the possibility of contamination of the samples by drilling mud and by air-borne materials. Bacterial contamination is known to occur, but the usual air-borne bacteria are easily recognized, for the most part by their relative transmittance to the electron beam. Objects not opaque to the electron beam were not considered likely to be fossilized.

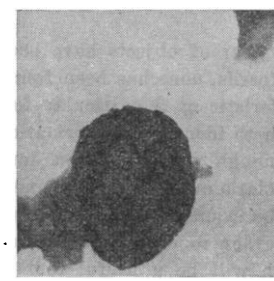

FIG. 3

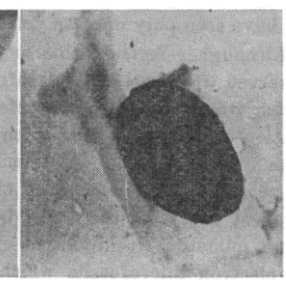

FIG. 4

Some objects were seen which may be fossilized spores of bacteria, algae, or fungi. These are somewhat discoid in shape, some having smooth edges, as shown in Fig. 1, and some having crenulated edges. The clue that these may be spores is strengthened somewhat by the finding of one group of discoids still fastened together by some sort of a membrane, although the membrane may possibly indicate contamination by contemporary organisms (Fig. 2). These discoids were found in most of the samples. They were so prevalent in all formations studied that they would not be suitable as marker types, unless it is found on further work that they have a definite geologic limit somewhere in the section. No evidence of such a limit was found, although investigation of older formations may indicate one. These discoids are somewhat similar to the spores of contemporary fungi such as *Penicillium notatum* and *Penicillium digitatum*, shown, respectively,

in Figs. 3 and 4. Knaysi, Baker, and Hillier (*1*) have described the endospores of *bacillus mycoides*, which show similarities to some of these fossils. Variations of the discoids include some having up to four perforations. We advance no hypotheses as to the nature of these objects. Possibly a mycologist may recognize them.

Besides the fairly numerous discoids, a number of other typical shapes were seen. A great many rod-like objects were observed, some of which were very probably minerals. Halloysite is known to have a rod-like crystal habit. The rods of halloysite observed by us have all had sharp edges, however, and many of those seen in the shales were rounded. They may actually be fossilized bacteria, but we cannot be certain. One of the rod-like types is shown in Fig. 5.

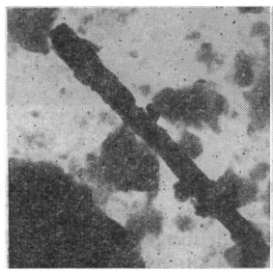

FIG. 5

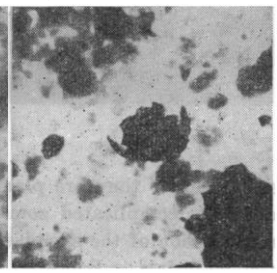

FIG. 6

A few other distinctive shapes are more rare. One of these is shown in Fig. 6. Several such shapes were found. There were also a few surprising shapes which we have seen only once as yet.

Although a considerable number of objects have been observed which may be microfossils, none has been found which was sufficiently characteristic of a particular formation or part of a formation to identify the formation from which it came. Not enough work has been done as yet to conclude that such markers do or do not exist. A great many samples must be examined and correlated from numerous localities in order to compile a catalog of electron microfossils which will be a useful tool in paleontology.

The technique must be examined critically at all stages, from the collection of the sample at the well to the final correlations. The ever-present possibility of contamination must not be overlooked. This contamination may come from the drilling mud or from careless handling of the samples after collection. The sample preparation, including the crushing and dispersion, should be standardized to allow workers in this field to exchange data on the same basis.

The work reported here is a small beginning on the problem. As in any new field, interest in the technique must at first be academic until enough data are amassed to make it useful. It does offer a possibility of making geologic correlations not now feasible.

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The Aerobee Sounding Rocket—A New Vehicle for Research in the Upper Atmosphere

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During the past two and a half years the captured German V-2 rockets have found wide and fruitful application as vehicles for the transport of research equipment into the upper atmosphere (*3*). The firings of the V-2s have been conducted by the U. S. Army Ordnance Department at the White Sands Proving Ground near Las Cruces, New Mexico.

From the beginning it was realized that the available supply of V-2 rockets was limited and that the expense of duplicating them in this country for application solely to research studies was probably prohibitive. Furthermore, the complexity of the control equipment and other necessary accessories required a large technical field group in preparation of the rockets for firing.

Early in 1946 the Applied Physics Laboratory of Johns Hopkins University initiated a program for the development of a small, relatively inexpensive sounding rocket to make possible exploratory as well as comprehensive studies of phenomena in the upper atmosphere, far above balloon altitudes, on a continuing, long-term basis. Support of this development was undertaken by the Navy Bureau of Ordnance with the assistance of the Office of Naval Research.

The Aerojet Engineering Corporation and the Douglas Aircraft Company have now successfully accomplished this development under the technical direction of this Laboratory. The immediate engineering basis for this new rocket was provided by the work of the Jet Propulsion Laboratory of the California Institute of Technology in the development of the WAC Corporal (*2*). In spite of the success of the WAC Corporal, its small payload and small useful volume severely limited its usefulness as a research vehicle.

A schematic outline of the Aerobee, as presently being built, is shown in Fig. 1. The payload of instruments is contained in a thin, pressure tight, ogival nose cone at the forward end of the rocket.

The basic diameter of the rocket is 15″, and the overall length, 226″; the nose cone is 88″ in length. Propulsion is in two stages: a solid fuel booster brings the velocity up to about 1,000′/sec, then falls away. The sustaining motor continues to propel the missile for about 45 sec. At the end of the powered period, the velocity of the rocket is about 4,100′/sec, and the altitude, about 95,000′ (as launched on a near-vertical trajectory). Typical summit altitude is over 70 miles, with a useful payload of 150 lbs of equipment. Payloads of 100–250

[1] Operating under contract NOrd 7386 with the U. S. Navy Bureau of Ordnance.