photography, including observations of the polarization of the radiation. A knowledge of the droplet size in the cloud would also be necessary.

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An Inexpensive Inoculation Chamber[1]

Plant tissue culturists working in sterile or aseptic atmospheres often do not need large areas in which to work. A small, portable chamber will usually suffice to prevent microorganism contamination to their culture containers. For this purpose, a small transfer cabinet was constructed simply and inexpensively. As can be seen from Fig. 1, it consists of plywood backs and sides and lucite top and hinged, slanting panel.

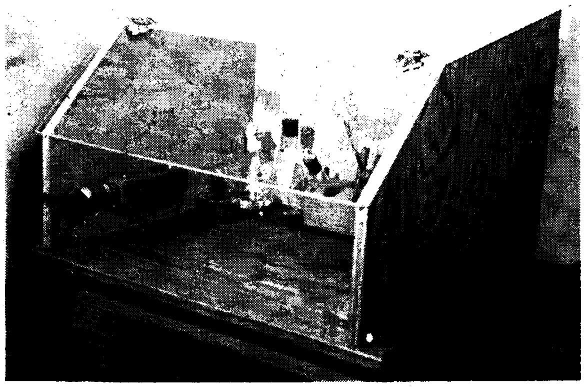

FIG. 1. Portable inoculation chamber.

Provision is made for a small light and necessary materials and working implements; if desired, an ultraviolet lamp may be placed on the back or top near the rear of the chamber. In the case cited, a Vycor No. 830-A, 16-in. ultraviolet lamp is used, attached to the plywood back, just below the lucite top (not shown in Fig. 1).

The cabinet has proved successful in everyday work, both from the standpoint of convenience and aseptic protection. It can be easily moved and adapted to any work area.

More details on the construction and dimensions are given in *Turtox News* (Apr. 1954).

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Geology of the Bedford Shale and Berea Sandstone in the Appalachian Basin

The Berea sandstone of early Mississippian age has been an important source of oil and gas in the Appalacian Basin for many years. This formation and the underlying Bedford shale are exposed at the surface in a long, narrow belt extending from northern Kentucky northward to Berea, Ohio, then eastward into Pennsylvania. From their outcrop, these beds dip east and south under the surface in eastern Ohio, western Pennsylvania, West Virginia, and eastern Kentucky. A study of the Bedford shale and the Berea sandstone at the outcrop and in the records of many thousands of wells drilled to these formations in the search for oil and gas has been completed recently by the U.S. Geological Survey, and the results are now being processed for publication. This study provides an understanding of the paleogeography of the region at the time the rocks were deposited.

In early Bedford time the region was flooded by a shallow arm of an epicontinental sea. This sea arm—the Ohio Bay—covered parts of Ohio, western Pennsylvania, western West Virginia, and eastern Kentucky and was bounded on the west by the Cincinnati arch, on the north by uplands in Ontario, and on the east and southeast by the low-lying Catskill delta of Devonian age.

From the upland in Ontario a vast river, the Ontario, carried sediments that were mainly red into the northern end of the Ohio Bay and deposited them on a delta that built southward. The sediments deposited above water in the main body of this delta retained their red color; those deposited under water were bleached to gray. Along the delta shores waves winnowed the sediments, removed the fine muds, and left the silts in offshore bars. One of these bars, in southern Ohio, is about 80 mi long and 6 mi wide. As the delta built southward, streams carrying mud and silt meandered slowly back and forth across the northern part of the delta and many channels became filled with mud and silt. By late Bedford time, the delta extended southward into northern Kentucky.

At the close of Bedford time, the areas to the north of Ohio Bay in Ontario and to the east in Pennsylvania and West Virginia were unwarped. The Ontario River cut rapidly and deeply into the northern part of the delta and abandoned the southern part by breaking out of the main channel and cutting southeastward. The sea soon encroached on the southern part of the delta.

In early Berea time, a vast quantity of fine sand was carried into northern Ohio by the Ontario River and deposited in the deep scour channels cut in the northern part of the delta in late Bedford time. These stream channels apparently were filled rapidly by this influx of sand and abandoned, for quarries at Berea and Amherst, Ohio, have quarried stone from these sand-filled channels that lie in Bedford shale, yet few fragments of shale are found within the quarry stone.

On the eastern side of the Ohio Bay, in West Virginia, streams brought in sand and silt from eastern and southeastern sources. For a brief time a shore line was established in western West Virginia, and bars formed along the shore near the mouths of the rivers. Marine beds, mainly silt and very fine sand, were deposited to the west in eastern Kentucky.

By middle Berea time, downwarp in eastern West Virginia depressed the eastern Ohio Bay area, and the sea transgressed the shallow river channels that had been scoured in early Berea time.

Near the end of Berea time, the lands around the Ohio Bay sank slightly and the sea encroached, covering the Berea delta in northern Ohio and the sand-filled stream courses in central West Virginia. By the close of Berea time, the transgressing sea had spread the reworked sand and silt into a broad, thin sheet that is nearly continuous from northern Ohio to southeastern West Virginia.

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Crystalline Regions in Metamict Minerals

A vexing problem in mineralogy is the nature of the metamict state [A. Pabst, *Am. Mineralogist* 37, 137 (1952)]. When certain minerals are subjected to emanations from radioactive elements, disorder in their structures results. Under prolonged or intense bombardment, damage to the original structure may be so great that the original structure cannot be directly determined by present x-ray or optical techniques.

In considering the problem, it seemed reasonable to expect that, even though damage is so great that the areas of relict crystal structure are too small and widely separated to be resolved optically or to give a meaningful x-ray diffraction pattern, they are large enough to be characterized by selected-area electron-diffraction patterns.

To test this hypothesis, samples of zircons from Ceylon and Oklahoma were examined. From each zircon two portions of material were selected—one was only weakly birefringent and gave a diffuse x-ray pattern, and the other was optically anisotropic and gave a sharp x-ray pattern. In every case, both portions gave sharp electron-diffraction patterns that were essentially identical.

These preliminary studies indicate that the electron-diffraction method is a powerful tool for the investigation of the physical nature of the metamict state and for the identification of metamict phases. Detailed investigations in this field are being continued.

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Geophysical Surveys in Salt Lake Valley, Utah

A few years ago while the point-to-point aeromagnetic profile was being recorded, as is customary on all cross-country flights of the U.S. Geological Survey aircraft, an anomaly was discovered in the Salt Lake Valley between the Park City–Little Cottonwood and the Bingham mining districts. Later an aeromagnetic survey with 1-mi spacing was made of the northern Oquirrh Range and the southern part of the Salt Lake Valley to determine the magnetic characteristics of the Bingham stocks, to map the anomaly discovered in the valley, and to investigate the possibility that it might represent an intrusive mass similar to the Bingham and Little Cottonwood stocks.

The resulting aeromagnetic map showed one large elliptical anomaly with its long axis east-west in the Bingham Canyon area. The high point was over the south edge of the Utah Copper stock, the southernmost of the Bingham stocks, where it is in contact with the Oquirrh formation. The anomaly was obviously related to the intrusions, and the displacement of the anomaly maximum from the center could be attributed to the greater concentration of magnetic minerals produced by the mineralization and contact metamorphism of the stock. In Salt Lake Valley, low magnetic gradients were observed in general, with the exception of the elongate high over the southern part, which may be an extension of the Bingham Canyon anomaly. This elongate high is north of and parallel to the Traverse Mountains from their intersection with the Oquirrh Range to the Lone Peak salient of the Wasatch Mountains; it lies over an area covered by valley fill. Within this elongate high are several closures of still greater magnitude. The most prominent, which is approximately 3 mi southwest of Draper, is comparable in magnitude and extent to the anomaly over the Bingham stocks. Depth estimates indicate the source of the anomaly to be near the surface.

In August and September 1953, a vertical intensity magnetic survey was made of an area of 5 mi^2 in the Jordan River valley south of Salt Lake City to provide more detailed information on the source of two of the prominent aeromagnetic anomalies, including the one near Draper. A gravity survey was also made to provide supplementary information to aid in the interpretation. The area in which the survey was made is entirely covered by alluvium, and there is no direct geologic evidence available on possible sources of these anomalies.

The vertical intensity magnetic map shows two magnetic highs, one sharp and the other broad, corresponding except in intensity to the aeromagnetic anomalies. A positive gravity anomaly superimposed on a strong regional trend was found in approximately the same location as the sharp magnetic anomaly, which corresponds to the previously mentioned Draper anomaly. Attention was concentrated on this anomaly, and the depth of the disturbing body