SCIENCE

23 October 1959

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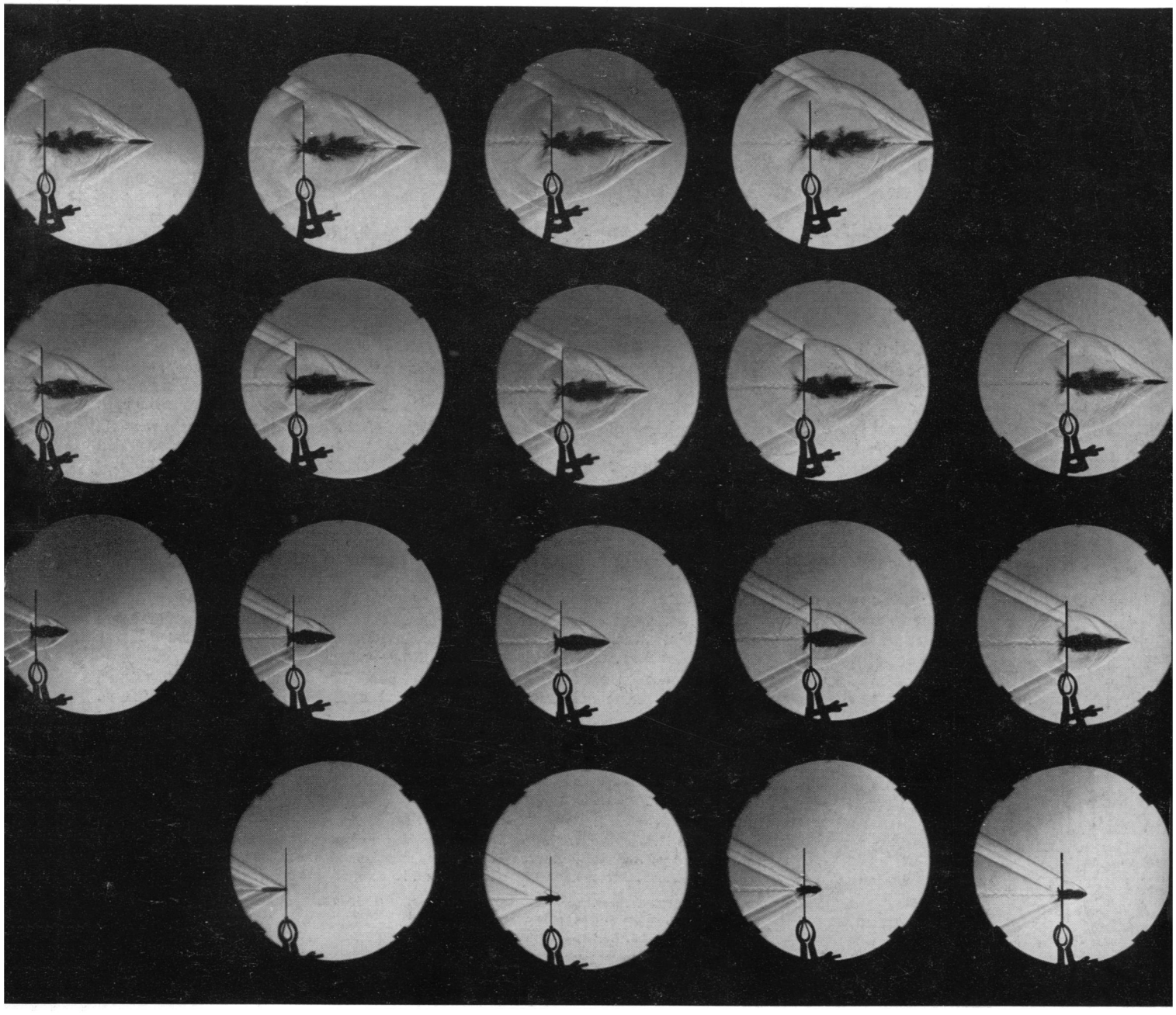
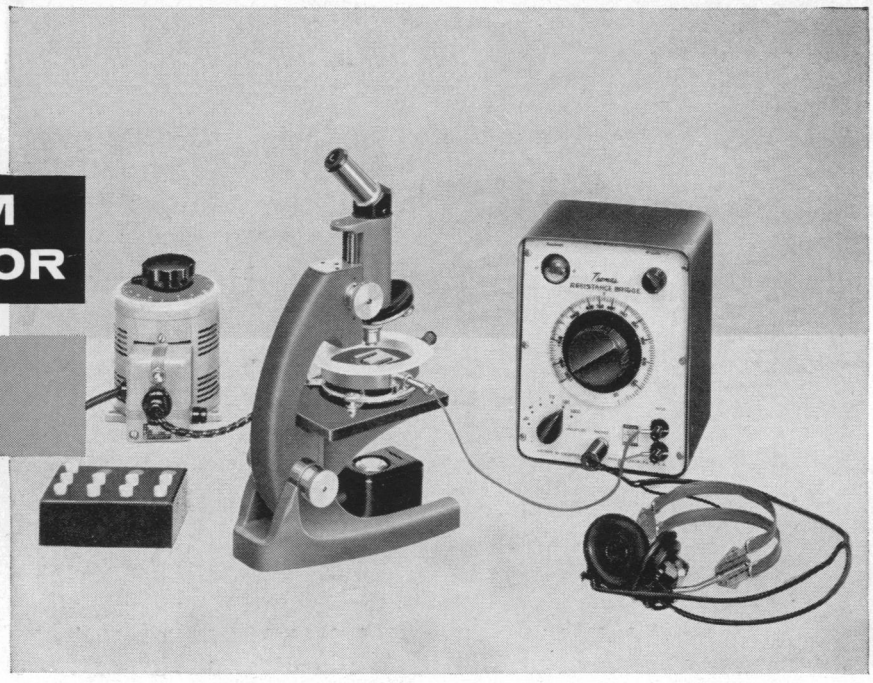


Instrument Issue

Thomas

AUDIOHM THERMISTOR *for* KOFLER HOT STAGE



. . . for determining melting points by use of a thermistor in place of mercury-in-glass thermometers

Advantages:

- **Can be used with any Thomas-Kofler Hot Stage**
- **Audible signal permits *uninterrupted* observation**
- **Single sensor for entire temperature range**
- **Faster response**
- **Simple graphic reader converts resistance values to temperature readings**
- **Bridge Alarm permits unattended heating and cooling of Stage**

3963-A7.

AUDIOHM THERMISTOR KOFLER HOT STAGE ASSEMBLY, Thomas. For determination of micro melting points and other fusion phenomena temperatures *without removing the eye from the microscope.*

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Earphones. For attachment to Resistance Bridge to detect null point of audible signal.

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23 October 1959, Volume 130, Number 3382

SCIENCE

Cover

Bullet penetrating a pane of glass. The framing sequence runs from bottom to top, left to right. This high-speed schlieren photograph was taken with a Cranz-Schardin camera by Pierre Naslin, Laboratoire Central de l'Armement, Paris, France. See page 1051.

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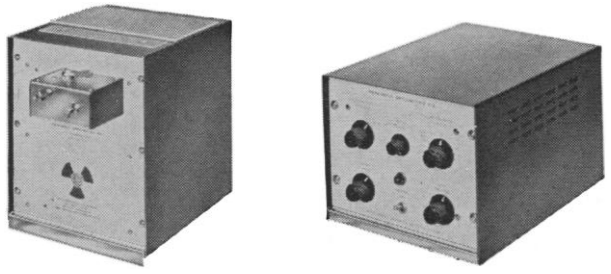

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Letters

Science in Spain

We find to the point much of the information provided by A. G. Verduch [*Science* **130**, 126 (1959)] in his comments on the article by David Gates on basic research in Europe [*Science* **128**, 227 (1958)]. But, although Verduch's comment on Spain is brief, it conveys the idea that research in Spain is "free"; that there is a free exchange of theory, methods, and ideas, when it is common knowledge that there exists a censorship which makes it difficult to receive information in such fields as political economy, evolution, and sociology.

Although much good work is actually done in Spain by our colleagues in the field of anthropology, this cannot, probably, erase the effects and norms of the regime. A few examples will suffice.

From *Manual de Antropología* (1946), by Pérez de Barradas, professor in anthropology: "There are anthropologists who still cannot do away with the evolutionist load" (page 12); and, "We think anthropology as a science should abandon the theme of the origin of man, and gallantly confess that it is not known when, where, or how man appeared on the earth, and also the utter failure of evolutionism" (page 25).

In volume 1 (1954) of the ten-volume *Historia Universal*, edited by S. A. Espasa-Calpe (one of the most renowned editors of Spain, if not the most renowned), in the chapter "The birth of humanity," there is a strong criticism of Weidenreich in which it is stated (page 101): "Today no one believes that man comes from an animal world of ancestors," and so on.

B. Melendez, professor of paleontology at the University of Madrid, and director of the department of paleontology of the National Museum of Natural Sciences, in the prologue to the book *Hacia el Origen del Hombre* (1956), by Valeriano Anderez Alonso, writes the same sort of equivocal concepts: "Organic evolution *within certain limits* [our italics] is a historical reality," and so on.

Since this is "Darwin's year," it seemed pertinent to us to provide the foregoing information and to give examples of the regrettable conditions that unhappily prevail in much of Spain's scientific life.

JUAN COMAS
T. SANTIAGO GENOVES
Instituto de Historia,
Torre de Humanidades,
Ciudad Universitaria, Mexico City

The Green Ray

Gerhart S. Schwarz says that the green ray can be seen only from an elevation but does not say how great an elevation [*Science* **130**, 276 (1959)].

I formerly had a shore cottage on the northwest shore of Oahu, and I have seen the green ray several dozens of times when my eyes were about 16 feet above sea level.

I have also seen the green ray from shipboard between Honolulu and California, in the North Atlantic Ocean, and in the Adriatic Sea.

Most remarkable, however, was seeing the green ray once from the observation platform at the rear of an eastbound train somewhere on the Great Plains.

HAROLD S. PALMER
Honolulu, Hawaii

In his letter concerning the green flash, Gerhart S. Schwarz says, "the green ray can be seen only when one views the horizon from an elevation, and this . . . plus factors of latitude, season, and weather . . . probably explains why few sea captains are familiar with it." This comment is misleading, for I have seen the green flash many times while sitting or standing on a beach or the deck of a ship. I have seen it also from planes and from mountain tops, and in latitudes from the Tropic of Capricorn to the Arctic Circle.

From an elevation, the green flash may at times be seen *before* the sun sets. On such occasion, two notches may be seen on the sides of the sun, and these two notches coming together at the top of the sun result in a green flash.

One may reasonably look for the green flash at sunset whenever one has a clear horizon to the west, and sea captains should have many opportunities to observe it.

CHARLES H. SMILEY
Ladd Observatory, Brown University,
Providence, Rhode Island

Stratospheric Fallout

Fry and Kuroda have recently studied stratospheric fallout, using the ratio Ba^{140}/Sr^{89} as a parameter. Their report [*Science* **129**, 1742 (1959)] appears open to serious objection. The basis of the authors' thesis is their assumption: "Since the fission products remain in the troposphere for only a month or two, the fallout since December or January must have originated almost exclusively from the stratosphere." This assumption is not estab-

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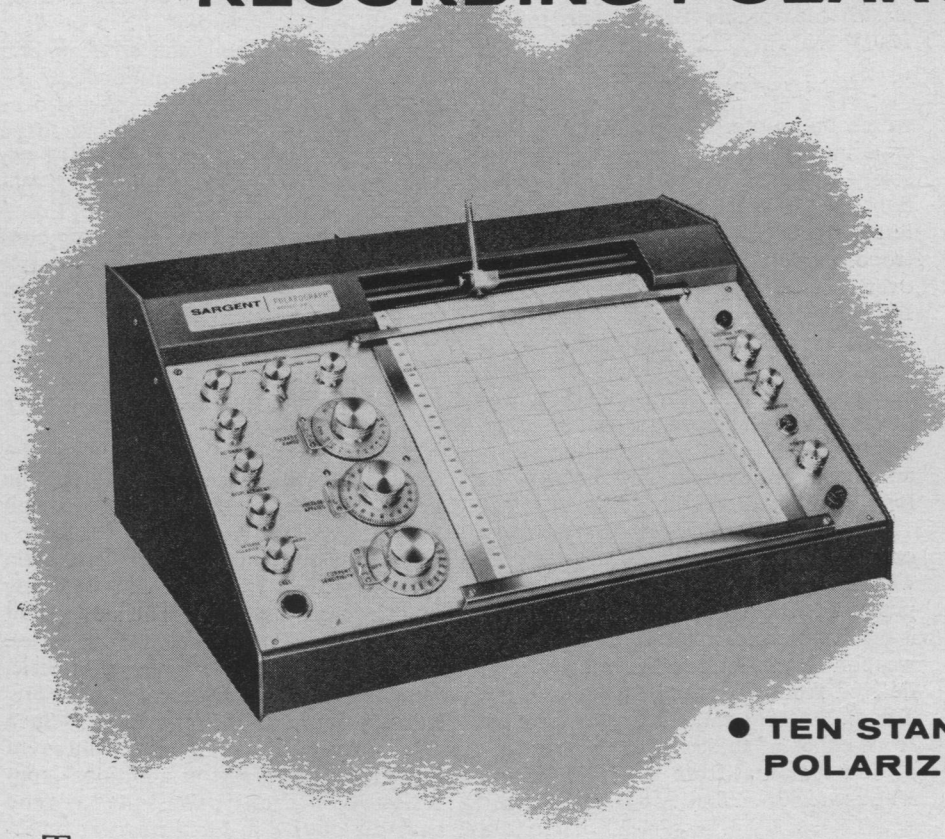

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lished; Machta, for example, in testimony before the Joint Congressional Committee on Atomic Energy (5–8 May 1959) states that *half* (my italics) of the tropospheric activity falls out every month. The clearing of the troposphere, with a 30-day half-life, cannot be considered complete while there is still measurable Ba^{140}, with only a 13-day half-life. Equation 1

$$[Ba^{140}/Sr^{89}]_R = ke^{-(\lambda_{140}-\lambda_{89})t}$$

which the authors use to describe their experimental results, can be derived solely on the basis that the contributions of the October-November 1958 test series, whether stratospheric or tropospheric, were in very large excess over pre-existing pools of Sr^{89} and Ba^{140}.

The extrapolated value of the Ba^{140}/Sr^{89} ratio (5.5 on 25 Oct. 1958) must be considered fortuitous, inasmuch as there is no particular reason to extrapolate to that date. An equally reasonable extrapolation might be to the middle of the U.S.S.R. test series, say 18 Oct. 1958, which would give an extrapolated Ba^{140}/Sr^{89} ratio of 7.3. The Ba^{140}/Sr^{89} ratio (5.5) in freshly produced U^{235} fission product mixture is not necessarily appropriate to weapon test fallout, which may well be derived from fission of Pu^{239} or U^{238}. The Ba^{140}/Sr^{89} ratio in fission product from either of these materials would be greater than that from U^{235} [S. Katcoff, *Nucleonics* **16**, 78 (1958)].

A. S. GOLDIN
Division of Radiological Health, Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio

Goldin claims that the basis of our thesis is the assumption: "Since the fission products remain in the troposphere for only a month or two, the fallout since December or January must have originated almost exclusively from the stratosphere." First of all, we wish to set the record straight by pointing out that such an assumption is neither necessary nor was it used either in deriving Eq. 1 or in arriving at the final conclusion.

As to the validity of the above statement per se, we might mention that Kuroda [*ANL-5920* (Oct. 1958), pp. 1-40] has estimated that 94 percent of the total Sr^{90} fallout was stratospheric during the period between 15 Oct. 1957 and 1 June 1958, at Lemont, Ill. In view of the fact that many nuclear explosions occurred during the above-mentioned period, whereas there was no explosion after the fall of 1958, it would be surprising indeed if the percentage of stratospheric fallout in the total fallout after December 1958 were not much higher than that in 1957–58.

In regard to Goldin's concern over "the clearing of the troposphere," we would like to emphasize the fact that our method is designed to work when "the clearing of the troposphere" is incomplete, as well as when it is complete. We have done this mathematically. Equation 2 leads to Eq. 1 when $A^*_{T,0} >> A_{T,0}$ and $A^*_{S,0} >> A_{S,0}$—that is, when both the stratospheric and tropospheric contributions of the test series are in very large excess over pre-existing pools of Sr^{89}. It has to be noted that this occurs regardless of the value of the $e^{(k_T-k_R)t}$ term in Eq. 2. We might add that Eq. 2 leads to Eq. 1 also, if either one of the following conditions is fulfilled:

$$A_{S,0} = 0 \text{ and } B_{S,0} = 0 \qquad (I)$$

or

$$A_{T,0} = 0 \text{ and } B_{T,0} = 0 \qquad (II)$$

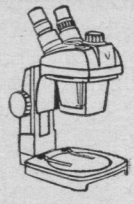
However, none of these terms can be assumed to have been zero during the period between the fall of 1958 and the spring of 1959.

It is an oversimplification for Goldin to say that Eq. 1 "can be derived solely on the basis that the contributions of the October-November 1958 test series, whether stratospheric or tropospheric, were in very large excess over pre-existing pools of Sr^{89} and Ba^{140}." Such an approach limits the usefulness of Eq. 1 and can result in additional confusion. We can demonstrate a good example of this in Goldin's next objection, concerning the extrapolation of the data.

To extrapolate the data, as Goldin suggests, to some earlier date would be meaningless because the stratospheric inventories of Ba^{140} and Sr^{89} have undergone considerable change between, say, 18 and 25 October, due to (i) new and undefined additions to the stratosphere during this time, (ii) radioactive decay, and (iii) fallout. After 25 October any changes were due to (ii) and (iii) only, which were used in deriving Eq. 2. The derivation of Eq. 2, however, does not take (i) into account, and any mechanical extrapolation of data not supported by theory only invites error in conclusions. Any extrapolation beyond 25 October will contain the error of disregarding the important factor (i).

Kuroda has explored the effect of fission of some materials other than U^{235} on the ratios of radionuclides, as suggested by Goldin. Our present data do not indicate that other materials were used, nor do they rule out this possibility.

LOIS FRY
P. K. KURODA
Department of Chemistry, University of Arkansas, Fayetteville



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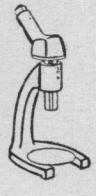

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(A cage in the Primate Laboratory of the University of Wisconsin. A rhesus monkey can be seen seizing a cloth pad held out by Prof. Harry F. Harlow, past President of the American Psychological Association.)

Dr. Harlow: ". . . This simple basic reaction made us believe we could define and measure what had previously been undefinable and unmeasurable—a baby's love for its mother. To create an inanimate substitute mother over which we would have complete experimental control . . . we constructed . . . a cloth mother . . . and a wire mother . . . We deliberately made the faces different . . ."

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It is one of the early frames of a remarkable series of film sequences in which Dr. Harlow, a noted psychologist, reveals many fascinating and unexpected reactions of babies to their mothers and presents some startling conclusions on mother love, based on a series of controlled experiments with monkeys.

In six widely acclaimed hour-long programs over the past two years, *Conquest* has presented penetrating studies of both the stratosphere and the ocean floor, probed the structure of the human heart and brain, and explored the depths of a volcano. This season it will expand its efforts in a series of twenty half-hour Sunday afternoon programs produced by the Public Affairs Department of CBS News in cooperation with the American Association for the Advancement of Science.

As in the past, it will again be sponsored by the Monsanto Chemical Company which has recognized its important contribution in generating national interest in the field of science and increasing public awareness of the shortages in this area.

Early this month *Conquest* received its most recent honors, when it became the only network television program to win the 1959 Howard W. Blakeslee Award of the American Heart Association, for its dramatic report on open heart surgery.

Conquest's past performance has moved the well-known television critic, John Crosby, to describe it as "the most interesting and sophisticated (science program) . . . I have seen. I mean simply that *Conquest's* technique of discussing and explaining difficult scientific advances is being handled easily and colloquially and without any loss of precision. This is a very great feat."

Just how great a feat it is you will have a chance to judge for yourself by keeping your eyes firmly fixed Sunday afternoons on the CBS Television Network. Here are a few of the additional programs you can look forward to in the immediate future.

November 8 **THE BOTTOM OF THE SEA** *Conquest* follows the bathyscaphe "Trieste" as it dives 4000 feet to observe life in the depths on the floor of the Pacific Ocean.

November 15 **THE WORLD OF TB** Dr. Rene J. Dubos of the Rockefeller Institute for Medical Research presents experiments demonstrating that proper diet can increase resistance to tuberculosis.

November 29 **THE LADDER OF LIFE** On the occasion of the 100th anniversary of Darwin's "Origin of the Species" Dr. Julian Huxley and Dr. H. B. D. Kettlewell offer contemporary evidence illustrating the theory of evolution.

December 6 **THE LANDING BARRIER** A plane that flies at supersonic speed and lands as slowly as a helicopter is the goal of aeronautical science. *Conquest* reports on the progress being made toward this goal at Princeton University.

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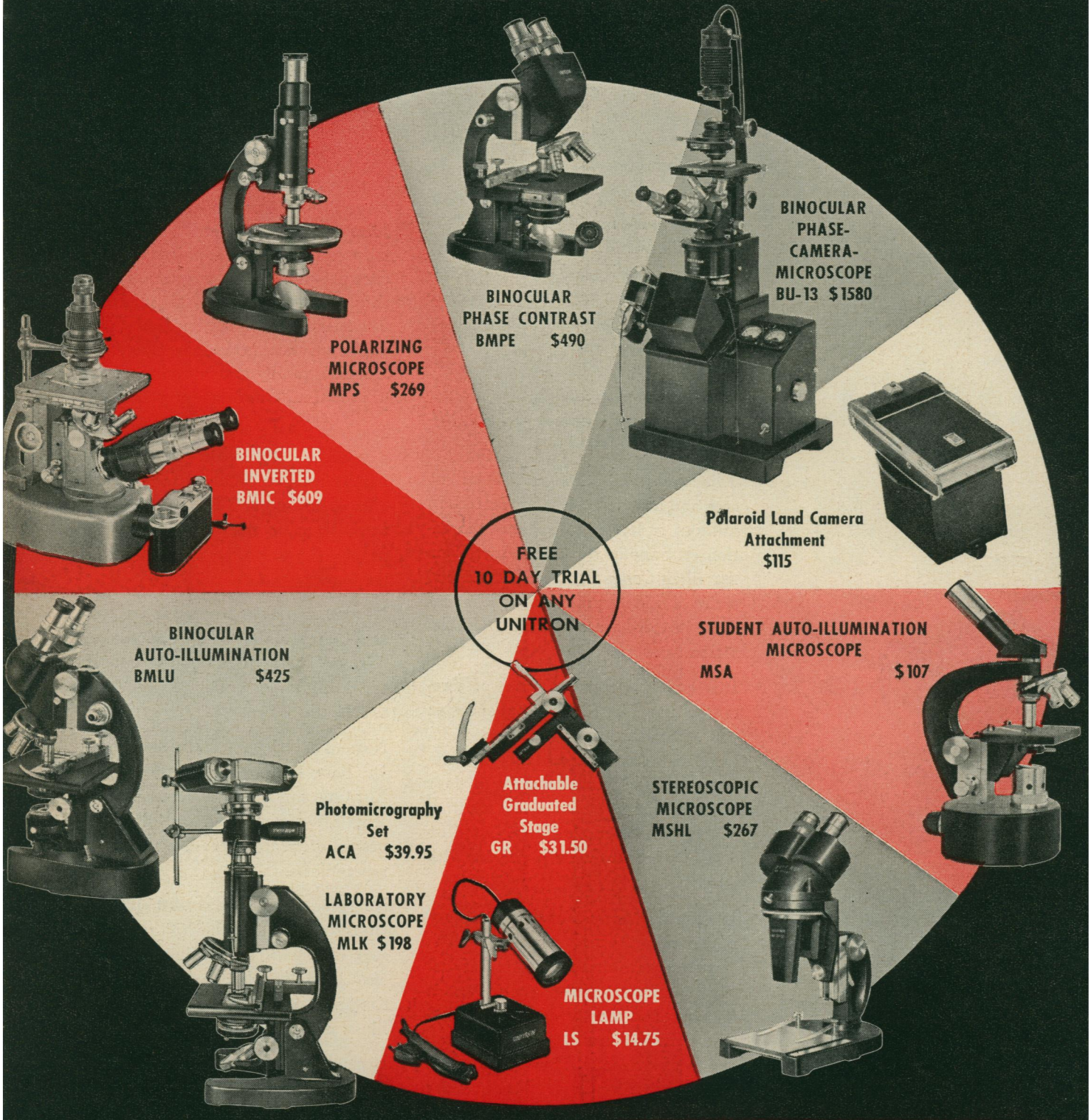

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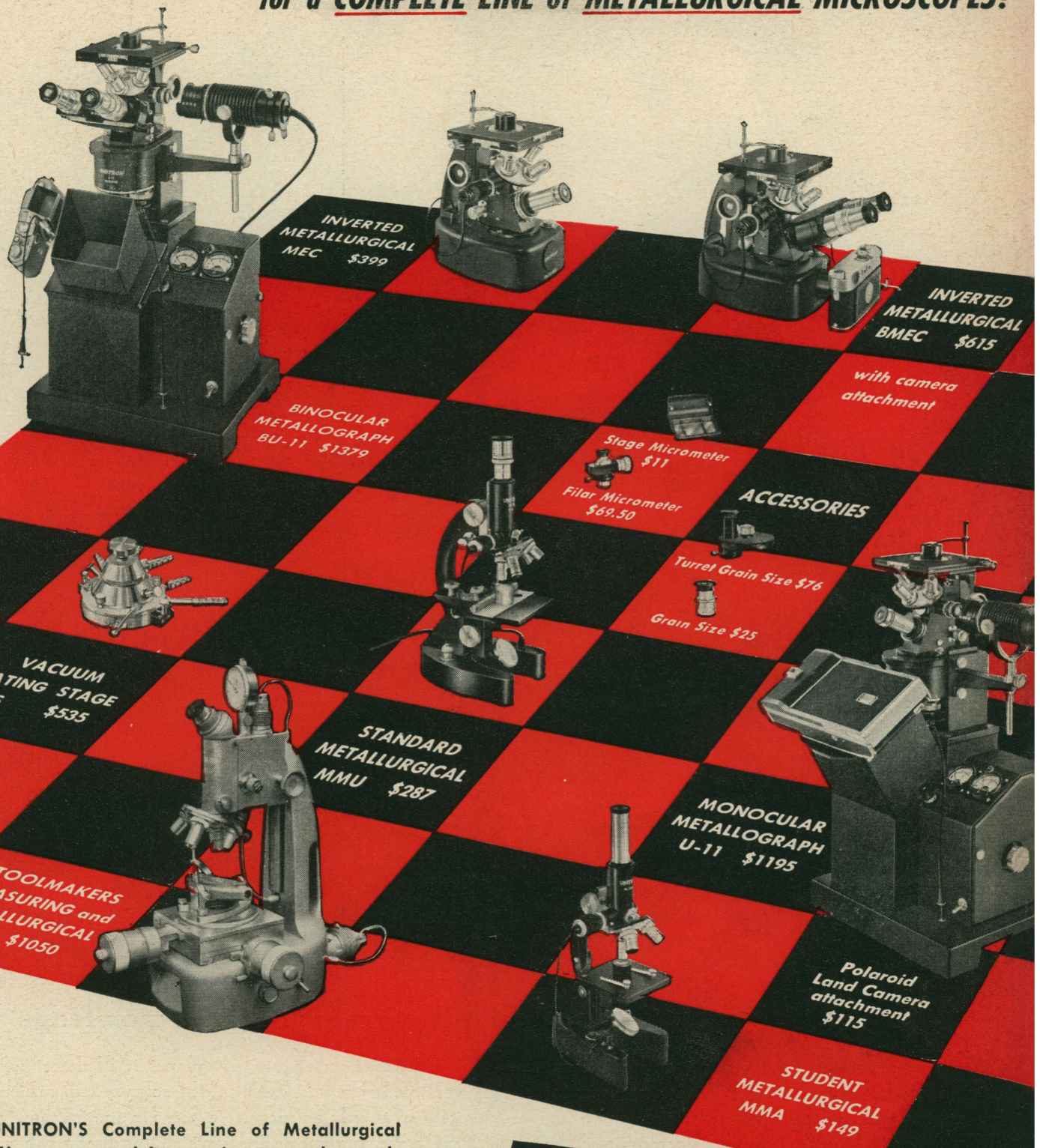

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—Exposition du Système du Monde, 1796.

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