strong enough to hold up the mass of sedimentary materials that are deposited at the mouths of great rivers. Others, especially geodesists and geophysicists, are of the opinion that the earth's crust is pressed downward by the accumulated sediments. The data for gravity stations established near the mouth of the Mississippi River indicate that the delta material for that river has pressed down the crust and that the crustal block below the delta is in approximate isostatic equilibrium. This is indicated by the small gravity anomalies based upon the isostatic theory.

It is of interest that four gravity stations were established in the spring of 1932 on the Nile Delta. The stations are:

Station	Latitude North	γ_0	Correction for height	Correction for isostasy and topography
Port Said ...	31° 15′	979.428	0	+.006
Ismailia	30° 36′	979.375	0	−.003
Mansura	31° 03′	979.412	−1	+.007
Damietta ...	31° 26′	979.441	0	+.012

The isostatic anomalies at these stations are as follows:

Station	γ (corrected)	g (observed)	$g-\gamma$
Port Said ...	979.434	979.448	+.014 gal
Ismailia	979.372	979.369	−.003 gal
Mansura	979.418	979.400	−.018 gal
Damietta	979.453	979.472	+.019 gal

The average of these anomalies is very close to zero, thus indicating that the crust beneath the delta must have been pushed down by the sediments unless the crust was subnormal in mass before the formation of the delta. In any event, since the anomalies are both positive and negative there is no indication that the crustal block involved is far from being in equilibrium.

It is hoped that additional gravity stations may be established on the Nile Delta in order to have further light thrown on this important subject of crustal equilibrium. It would be particularly desirable that the new stations furnish data from which one might determine the extent of the areas having positive and negative anomalies.

It would be of the greatest importance to geological and geophysical investigation if intensive gravity surveys could be made over the deltas of all the great rivers of the world. It is hoped that this work may be undertaken by the countries involved when normal economic conditions return.

W. BOWIE

AWARDS OF THE GUGGENHEIM FOUNDATION

ANNOUNCEMENT of the tenth annual fellowship awards by the trustees of the John Simon Guggenheim Memorial Foundation brings the total grants of the foundation to assist American scholars and artists to carry on research and creative work to more than $1,200,000 and the total number of fellowships awarded to 577. The names of forty Americans are on this year's list of awards. Another series of grants to Latin-American scholars will be made in June.

The foundation was established in 1925 by former United States Senator Simon Guggenheim and Mrs. Guggenheim as a memorial to a son, and its capital fund is wholly their gift. All its income is used to assist scholars and artists from the United States and certain Latin-American countries to carry on research and creative work for a period of time with complete freedom from competing interests. In making the awards, the foundation has no restrictions of race, color or creed. Men and women, married or unmarried, are eligible on equal terms. The stipends, normally $2,000 a year, are adjusted to meet the needs of the individual fellows. The periods for which the fellowships are granted vary with the necessities of the work that they have in hand. Heretofore the fellowships, which are tenable under the freest possible conditions, have been granted only for work abroad, but this year provision also is made to permit some fellows to work in the United States.

The committee of selection was composed of President Frank Aydelotte, of Swarthmore College, *chairman;* Dean Guy Stanton Ford, of the University of Minnesota; Professor Marjorie Nicolson, of Smith College; Dean Charles B. Lipman, of the University of California, and Professor E. B. Wilson, of the Harvard School of Public Health.

In fields of the physical sciences, the following grants have been made:

Dr. Robert B. Brode, professor of physics, University of California. *Project:* Research in the field of collisions of electrons with atoms, chiefly at the Cavendish Laboratory of the University of Cambridge, England.

Dr. Frank H. Spedding, instructor in chemistry, University of California. *Project:* Studies of solids at low temperatures with particular emphasis on their line-like absorption spectra, their magnetic susceptibilities, their electrical conductivities and the relations between these, in European laboratories.

Dr. Francis William Bergstrom, assistant professor of chemistry, Stanford University. *Project:* A study of the methods used in certain European institutions for the investigation of heterocyclic compounds containing nitrogen.

Dr. Kenneth T. Bainbridge. *Project:* Continuation of research in nuclear physics at the Cavendish Laboratory of the University of Cambridge. Dr. Bainbridge has recently been appointed to an assistant professorship of physics at Harvard University.

Dr. Arnold Dresden, professor of mathematics, Swarthmore College. *Project:* The preparation of a book on the calculus of variations, an attempt to unify the three points of view which are now dominant in this field, at Pisa and the Institute for Advanced Study at Princeton.

For biological investigations, the following fellowships are announced:

Dr. Harold Kirby, Jr., associate professor of zoology at the University of California, will make studies, chiefly in South Africa and Madagascar, of the Protozoa living in termites, for the purpose of contributing toward a solution of problems in the field of host-parasite relations.

Dr. George Oswald Burr, associate professor of botany at the University of Minnesota, will carry on research in the field of photosynthesis, in certain European laboratories.

Dr. Allan Lyle Grafflin, instructor in anatomy at Harvard University, will make certain investigations of kidney structures in fishes, and collect material for later detailed microscopic studies, at Naples, Italy, and Plymouth, England.

Joseph Fulling Fishman, formerly third deputy commissioner of correction of the City of New York, will shortly enter upon the fellowship previously awarded him for making studies in the field of penology abroad.

Arthur Loveridge, who is now in Kenya on a fellowship, has received a further grant to continue his ecological studies of the vanishing vertebrate fauna of the tropical rain-forest remnants of East Africa.

Dr. Michael Heidelberger, associate professor of biological chemistry at Columbia University and chemist to the medical staff of the Presbyterian Hospital, New York, will go to the University of Upsala, Sweden, to carry on researches on the molecular weight of thyroglobulin, the hormone of the thyroid gland.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

STROBOPHOTOGRAPHY IN BIRD SINGING

THE same problems of notating folk music encountered by anthropologists have been met by ornithologists in notating bird singing. The sluggishness of the ear in perceiving only gross effects, the limitations of the conventional notation system and the habit of reference to the European system of music are all opposed to finished work by both groups of scientists. As in the case of folk music,[1] the odd intervals, subtle turns, twists, intonations, quavers, trills, tremolos, slurs and unusual rhythmical and melodic performances have necessarily been passed over in the song of birds.

The application of methods of photographing auditory stimuli and a plotting of the measures on the pattern notation has revealed in a preliminary way some gratifying results in the musical performances of the nightingale, the European mocking-bird (*Hippolais icterina*), the chaffinch (Pinzón), the garden warbler (Luruja), the canary and the canary-finch (*Fringilla-canaria*). The possibilities of this approach are illustrated in Fig. 1, representing one of the musical autographs of the European mocking-bird. This note sequence is repeated four times with little variation of each pitch pattern in the repetitions.[2]

The notes of the European mocking-bird are brief and almost continually changing in pitch, explaining why the study of intervals by ear is a difficult one. Note that the compass of the song is over three octaves.

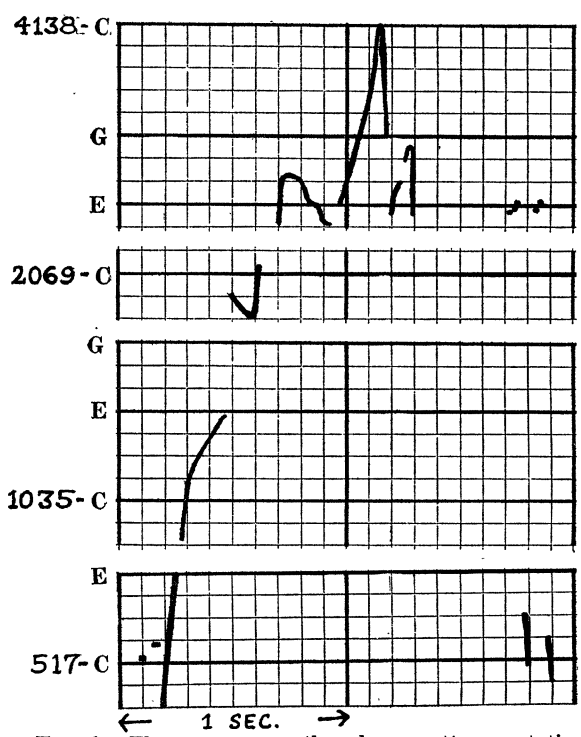

FIG. 1. The squares on the above pattern notation represent one half step (International tempered scale) vertically and one tenth of a second horizontally.

[1] M. Metfessel, "Phonophotography in Folk Music." University of North Carolina Press, Chapel Hill, 1928.

[2] The photograph was taken from Polydor phonograph record No. B–9509, with the needle placed 2 cm in from the first groove on the record.