neys between its nesting ground and its winter quarters and nested four seasons—at least three of which were successive—in the same sector of the same colony; it had a different mate in 1935 and 1936; it was killed and partially eaten by a house rat in a burrow a few yards from the one occupied by it four years earlier.

NEW YORK STATE MUSEUM ALBANY, N. Y. DAYTON STONER

SPECIAL CORRESPONDENCE

FOUNDATION OF THE PONTIFICAL ACADEMY OF SCIENCES

THE Pontifical Academy of Sciences, which was founded on the 28th of October, 1936, is the last outcome of a long unbroken academic line. The original founder of the Roman Academy was Prince Cesi, who in 1603 had the idea of an organization designed to further knowledge by inquiry and discussion. He meant it, however, to lie within the Aristotelian frame of thought. His academy precedes those of Paris, London, Petersburg, the Caesare-Leopoldina and even the Florentine one of the *Cimento*. Less than any other, perhaps, it owes its idea to the Baconian *Nova Atlantis*; actually it was born of the fervor of a young Roman nobleman whom an ailing body and meditative seclusion helped to mature a vast design. Together with three friends, two Italians (and Umbrians, in fact, from his own province—Francesco Stelluti and Anastasio de Filiis)—and a Dutchman, Johan Heck, he conceived an institution whose name and general conception really harked back to Plato and to his academy, to this date the longest-lived educational institution of the world, as it lasted uninterruptedly for nearly nine centuries.

The dream of Federigo Cesi was more monastic and aristocratic than that inspired by Baconian practicality. His academy was meant essentially as a way of life and as an encouragement to disinterested research: "Through the creation we must reach again the Creator." The academicians were to be the "Lynx-eyed Ones"; their emblem was a lynx with the motto: "Sagacius ista."

The family of Federigo Cesi all but wrecked the plan in its inception, and went so far as to make it necessary for his friends to leave Rome; but after 1609 the academy grew and extended to international activity. At the same time there came an inevitable break with the Aristotelian tradition, a break not explicitly professed but simply due to the fact that the academy was alive to the urge of the times. They willingly gave hospitality to Galileo; in fact, it was they who printed his dissertation on the sun-spots, directed against the Aristotelian sticklers in 1610, and in 1623 they printed his famous polemical essay, "Il Saggiatore." After the death of Federigo Cesi the academy entered a period of eclipse and had to be reinstated by Benedict XIV, the energetic "Pope Lambertini," as the "Academy of the Nuovi Lincei"; but it does not seem to have achieved any results worthy of note until through the efforts of F. Scarpellini and the advice of Gaspard Monge, at that time a consul of the Roman Republic invented by Napoleon, it started life again at the beginning of the nineteenth century. It was, however, a brief flicker of life, mainly upheld by the Caetani family, who have an unbroken tradition of princely scholarship reaching to our age; and that flicker went out again under the adverse rule of Gregory XVI. Upon his advent in 1847, Pius IX reinstated the academy in its full title and belongings as the "Pontificia Accademia dei Nuovi Lincei" and gave it a stable seat; the academy encouraged the work of such astronomers as Secchi and Respighi. But its intellectual leadership came to an end with the capture of Rome in 1870. The Italian Government then took over the historic name for its National Academy, which was called "Accademia dei Lincei" and given a rôle similar to that of the French *Institut*. Thus the "Nuovi Lincei" was cut out of much of its natural field of activity and carried on a reduced existence, chiefly through the scholarly activity and munificence of Prince Baldassarre Boncompagni, the well-known historian of mathematics and founder of *Boncompagni's Bulletin*.

Leo XIII encouraged his sadly dwarfed academy and gave it another constitution, but it was reserved for the present Pope, himself a scholar, and an academic figure of great distinction, to reinstate it in its full working order. His right hand in this work was Father Gianfranceschi, a physicist and an able organizer. After his death the burden fell upon the Franciscan Father Agostino Gemelli, physiologist, rector of the University of the Sacred Heart at Milan and possessed of the most remarkable temperament for scientific leadership that the Roman Church has had for many years. The endowment was increased, a new seat was arranged in the Vatican Gardens, and a solemn session of inauguration was held on January 12, 1936.

For this rebirth the scholarly activities and deep interest in science of the present Pontiff might be a sufficient justification. As it happens, however, there may well have been contributory reasons of a different nature. The conciliation with the Italian state, while healing a breach which had lasted for almost sixty years, suddenly put back the Holy See into the condition of a temporal power in its own right, however diminutive its home (forty-four hectares of the City

of the Vatican). With its newly acquired sovereignty the Pope decided to conjoin the greatest possible outward consecration and at the same time to increase its degree of material independence and dignity by such edifices as a railway station, a radio broadcasting station, a post office, a new museum and other necessary government buildings. The reconstituted Pontifical Academy forms an integral part of this general plan, which is attributable to the Pope himself in its idea and inception.

The home of the academy is conformable to the idea of concentrated and symbolic magnificence as appropriate to the present sovereign state. It is the "Casina di Pio IV" in the Vatican Gardens, a charming Renaissance pavilion, originally meant for the afternoon relaxation of the Papal Court—the work of Pirro Ligorio, and a typical case of the ancient Roman pattern seen through the imaginative Renaissance eyes. Burckhardt called it the finest among the mansions of modern architecture of that order. To this, as its dimensions were restrictive, the present Pope added a new wing with a meeting hall, and the garden landscape around it has been reshaped so as to provide an impressive setting.

In 1936, the Pontifical Epistle "In Multis Solaciis" provided the academy with its new constitution. This year, on May 31 (the birthday of His Holiness), as many as possible of the new academicians, seventy in number, convened from all over the world to a solemn meeting and were royally entertained. Each was presented with the medallic insignia bearing the motto *Deus Scientiarum Dominus* of the academy on one side and on the other the engraved name of the recipient. The Pope was to have presided personally at the opening ceremony and to have given audience to the members. It was known that he looked forward very much to this event, but due to his momentary condition of health, it was Cardinal Pacelli, Secretary of State, who delivered the opening address on the following day. We shall quote a few excerpts from his characteristic speech:

> It was the dearest wish of the Supreme Pontiff to be able to inaugurate himself this scientific senate; for its mission appeared to him to come in all its effulgence out of the same divine source whence there pour out and descend to man the potent streams of the natural and rational sciences and the great river of revealed wisdom. Notwithstanding that the latter comes forth from deeper waters inaccessible to reason but not to Faith, and yet not less certain and true; whereas these wherever man looks for and finds truth, from whatever river of creation, from the skies, the oceans, the terrestrial abysses they may break forth and give light to the human mind, they prepare and build the access to the temporal faith, the steps to the sancta sanctorum behind whose veil are hidden the secrets of the Deity. All of nature is directed towards man, and the end of the motion of the skies, as says St. Thomas Aquinas, points to man as the last end in the circle of beings that can be generated and moved. But man in his turn is directed and formed in that image and similitude which marks in him the face of God, to that glory that the skies sing forever. . . .
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> His Holiness would have liked to remind you how on many occasions he happened to ponder upon a work which is among the greatest contained in the Scriptures and which concerns the men of the Church, a work which includes obviously also the teachers and learners of the faith and of truth in general. "As thou hast cast forth science, thus shall I cast forth thee."—*Hosea IV, 6.*
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> In truth, there are many to whom science and faith spell an almost irreconcilable contrast. It is not so and it can not be so for the Holy Father nor for those who consider that science is the quest for truth as it is to be found in the natural relation of creation, and that faith is the homage of the created intellect to the truth directly revealed by the Creator. Thus, it is evident that this homage of created intellect will never be more worthy of the Creator than when it is illuminated by the splendors of science.

The opening meeting was indeed an impressive occasion, and many among the great names of world science were present: Planck, Bohr, Birkhoff, Abderhalden, Levi-Civita, Volterra, Rutherford, Schroedinger, Debye, Carrel. The Sacred College and the diplomatic body were amply represented.

The choice of members of the newly instituted academy has been truly, and in more than one sense, catholic. Not only do the seventy include many Protestant and not a few Jewish members, but also certain ones who might not have found unconditioned favor in the eyes of the Italian government. The present membership is self-perpetuating.

After the speeches and the presentation of original papers at the first regular scientific session, Professor Colonnetti suggested that the academy should not only encourage research in the ordinarily accepted ways but should also provide a center of discussion, expression and "mise au point" of the new points of view and possibilities which emerge from the different specialties; this, he said, would be to revert to the traditional position of leadership and relationship that belong to the institution. To this Professors Armellini and Bottazzi inquired if such an attempt might not lead to an undue lowering of the strictly scientific level, since, in fact, such discussion might be termed vulgarization. They suggested instead a more prudent critical activity limited to the crucial points of divergence, as between physical and biological sciences. No doubt the special activities to be undertaken will evolve very gradually.

The American members of the academy are George D. Birkhoff, Alexis Carrel, Robert A. Millikan, Thomas H. Morgan, George S. Sperti and Hugh S. Taylor, of

whom Birkhoff, Sperti and Taylor were present at the opening meeting. Carrel is the only one of these who was a member of the antecedent Nuovi Lincei.

Two particularly interesting material provisions are for publication within a few days of all papers presented to the academy, and the exceptional facilities for bringing the members to the two principal annual meetings.—CORRESPONDENT.

SCIENTIFIC BOOKS

THE SPECIES PROBLEM

Genetics and the Origin of Species. By THEODOSIUS DOBZHANSKY. New York: Columbia University Press. 1937. 364 pp.

THIS book will be welcomed by all students of genetics or evolution, all those who care anything about the "Why is it?" in biology. The chapter headings give a good idea of the contents: Organic Diversity, Gene Mutation, Mutation as a Basis for Racial and Specific Differences, Chromosomal Changes, Variation in Natural Populations, Selection, Polyploidy, Isolating Mechanisms, Hybrid Sterility, Species as Natural Units. In my estimation it is the best book on these subjects ever written. It is the best because, being thoroughly well done, it includes the results of so many important recent researches, and so brings us up to date. In future years, still better books will be written, not necessarily by more gifted authors, but including the new knowledge which has been gained in the interval. Biological workers everywhere, whether teachers or investigators, will need to read Dobzhansky's book, and it will be a revelation to them. Few there are who have the time or opportunity to keep up with the literature published in many countries, in different languages; and even those who may have read all the more important papers need a synthesis of the results. I have found the book very stimulating and suggestive, so that it would be easy, in reviewing it, to fill a whole number of SCIENCE. The several discussions call to mind other facts which might have been cited, or open up new avenues of thought. Sometimes I have wished that Dobzhansky had dealt with this or that matter, but for practical reasons it was expedient to keep the book down to a moderate size, and had it been two or three times as large, it probably would not have served its purpose as well. Yet I should like to see a series of other books, dealing with special groups of animals and plants in the same spirit but giving all the essential information available. Such books might treat of such things as roses, mice, butterflies, land snails, freshwater fishes, and so forth. It is of great importance to get down to actual facts, instead of reasoning about abstract principles, with mathematically conceived examples which may not correspond with anything in nature. There are two principal modes of approach, extremes which meet in a synthetic treatment. We all know how Mendel made his great discovery by fixing his attention, not on the genus, species or even the individual as a whole, but on certain characters of the individual. Modern genetics has developed along the same lines, but it is obvious that the realities of nature include individuals, species, genera and larger groups, and finally the whole biota, animal and plant life together. The Mendelian is likely to feel that while the biota is very interesting, it is too complex to be intelligible. No one ever knew all the forms of life existing on a single hillside. The ecologists, to judge from their published work, usually simplify their problem by ignoring a large part of the facts, and sometimes the botanical journals, following this trend, publish a class of papers which I have called "Botany without Plants." Dobzhansky faces this dilemma as well as it can be faced at the present time, and one has the feeling that although the brevity of human life and the limitations of the mind forbid a complete analysis even of the knowable, yet it is possible to approach life intelligently and understand many of the more interesting phenomena. There is no reason, indeed, why such knowledge should not form part of the equipment of every educated person.

It will be a surprise to many to see how much of the discussion is based on very recent work. The bibliography, of twenty-eight pages, does not include the names of Darwin, Mendel or Morgan, the three great foundation-builders in the field covered. This does not imply, of course, any lack of appreciation of these masters, but merely that the book is essentially a description of the superstructure raised on their foundations. The authors who have ten or more titles cited are Dobzhansky, Federley, Goldschmidt, Sturtevant and Timofeeff-Ressovsky. Of course no one would pretend that the number of titles is necessarily indicative of the importance of the work, yet it does show activity. In the index, those cited ten or more times include the above, and also Blakeslee, Darwin, R. A. Fisher and S. Wright.

Among the broader topics discussed are those concerning the nature of species and the tendency of populations to break up into races and species. "There is, however, a single systematic category which, in contrast to others, has withstood all the changes in the nomenclature with an amazing tenacity. This is the category of species" (p. 306). But it is pointed out that species, in the ordinary sense, are to be observed in bisexual organisms, but are much less easy to define in those which reproduce vegetatively or without sexual union. An illuminating example, not cited by Dobzhansky, is that of the perennial sunflowers. In the north-central states there are species which rarely reproduce by seed. If, as sometimes happens, hybrids