any occasion for appealing to a member of the legislative branch of the government concerning business transactions in the executive departments.

(6) If the instruments or materials are delivered from time to time, tests are necessary in order to see that the deliveries are in accordance with the samples or the specifications. If deliveries are accepted without tests or inspection, or with inspection only, the door is opened for deception and fraud; honest dealers or manufacturers are at a disadvantage in competition with unscrupulous ones in dealing with the government; and it may result under such circumstances that the most reliable manufacturers will refrain from bidding on government business, leaving those who are willing to misrepresent their products to compete with one another for the government patronage. The government then becomes a party to fraudulent transactions, and to a greater or less extent tends to demoralize business. On the other hand, if careful inspections and tests are regularly made, and acceptances are conditioned on meeting the specifications, manufacturers often thereby become better acquainted with the properties of their own products, honesty and uprightness in business are encouraged, a standard of quality is set for the given instrument or material which helps other purchasers besides the government, and the whole industry may be greatly benefited.

(7) If the reports of such tests are communicated to the manufacturers, as they generally are, defects in the product are perhaps sooner discovered and sooner remedied, and if the government invites the cooperation of the manufacturers when undertaking tests of types of instruments or of materials, the tests are likely to be fairly conducted and the results representative.

(8) In these days of commercial combinations and gentlemen's agreements as to prices, it sometimes happens that the government can not secure competition in price, but finds that the bids from different manufacturers are identical in price. Here again, testing the product solves an otherwise serious difficulty, for it is generally possible even in this case to secure real competition as to quality, and this is quite as important as competition in price.

It is thus seen that there are many reasons for testing the thousands of kinds of instruments, machines and materials purchased by the government, and for doing this, in large measure at least, in a well-equipped institution set apart for that purpose. The Bureau of Standards has done considerable work of this kind, but the government's purchases are so varied and so vast, and so many requests for tests came from states, municipalities, and the public, that the work involved is very great, and only a fraction of the work is done which could be done with profit. Whether the bureau shall grow in the future as fast as the demands upon it for testing and investigation increase is uncertain. But if it does only a part of the work waiting to be done, and does that part well, it will amply justify its existence, and in so doing save the government and benefit the industries far more than the cost of its maintenance.

EDWARD B. ROSA
BUREAU OF STANDARDS

PROGRESS IN INDUSTRIAL FELLOWSHIPS

IN the issue of SCIENCE for Friday, May 7, 1909, I presented the main outlines and contemporary status of a scheme of industrial fellowships initiated by me in an article in the *North American Review* for May, 1907. Since this statement I have made no report to this journal.

I now present the establishment of a new

series of fellowships, not only at the University of Kansas, but at the University of Pittsburgh. The industrial fellowships so far established at the University of Pittsburgh and now in operation are as follows:

1. *Baking.*—$750 a year for 2 years. Additional cash bonus of $2,000. Fellow: Wilber A. Hobbs, A.B., University of Kansas, instructor in chemistry.

2, 3. *Abatement of the Smoke Nuisance (Multiple Fellowship).*—$12,000 a year for 2 years. Additional consideration, 49 per cent. collective interest. Fellows: Raymond C. Benner (senior fellow), Ph.D. University of Wisconsin, assistant professor University of Arizona; W. W. Strong (second fellow), Ph.D. Johns Hopkins University, Carnegie assistant and assistant in chemistry Johns Hopkins University. Other fellows to be appointed.

5. *On the Relation of the Pots to Glass in Glassmaking and the Elimination of "Strea."*—$1,500 a year for 2 years. Additional cash bonus of $2,000. Fellow: Samuel Ray Scholes, Ph.D. Yale University, H. B. Loomis fellow in chemistry Yale University.

6, 7, 8. *Baking (wholly Independent of but with Acquiescence of No. 1) (Multiple Fellowship).*—$4,750 a year for 2 years. Additional consideration of $10,000. Fellows: Henry A. Kohman (senior fellow), Ph.D. University of Kansas, holder of National Association of Master Bakers' fellowship; Charles Hoffman (second fellow), B.S. University of Kansas, laboratory assistant Yale University; Alfred Edward Blake (third fellow), B.S. New Hampshire College, assistant in chemistry Rensselaer Polytechnic Institute.

9. *Glue.*—$1,200 a year for 2 years. Fellow: Ralph C. Shuey, B.S. University of Kansas, former industrial fellow University of Kansas.

10. *Soap.*—$1,200 a year for 2 years. Fellow: Paul R. Parmelee, B.S. University of Kansas, curator of chemistry and pharmacy department, University of Kansas.

11. *Utilization of Fruit Waste.*—$1,000 a year for 2 years. Additional consideration, $10,000. Fellow: F. Alex. McDermott, George Washington University, of Hygienic Laboratory, Washington, D. C.

12, 13, 14, 15, 16. *Crude Petroleum (Multiple).*—$10,000 a year for 2 years. Collective interest of 10 per cent. Fellows: Raymond F. Bacon (senior fellow), Ph.D. University of Chicago, chemist Bureau of Science, Manila, assistant chemist Bureau of Chemistry, Washington, D. C.; Lester A. Pratt (second fellow), M.S. New Hampshire College, instructor at New Hampshire College; C. W. Clark (third fellow), M.A. Ohio State University, assistant chemist Bureau of Chemistry, Washington, D. C.; Hugh Clark (fourth fellow), M.A. Ohio State University; Arthur H. Myer (fifth fellow), A.M. Leland Stanford University, assistant department of chemistry, Stanford; Fred W. Padgett (scholar), University of Kansas.

17. *Composition Flooring.*—$1,500 a year for 2 years. 1 per cent. of sales for 5 years. Fellow: R. R. Shively, B.S. Oklahoma A. & M. College, assistant chemist Bureau of Chemistry, Washington, D. C.

18, 19. *Natural Gas (Multiple).*—$4,000 a year for 2 years. 5 per cent. of industrial results. Fellows: Clarence L. Speyers (senior fellow), Ph.D. Harvard University, Carnegie assistant Harvard University; Roy H. Uhlinger (second fellow), M.A. University of Pittsburgh, fellow in chemistry University of Pittsburgh.

20. *Cement.*—$1,800 a year for 2 years. $10,000 additional consideration. Fellow: J. F. MacKey, Ph.D. University of Toronto, former industrial fellow University of Kansas.

The fellowships above listed went into operation September 1 of the current year. They involve the work of twenty fellows and a salary list of $39,700 a year for two years, or $79,400 in all. The work is being conducted in a temporary but efficient building erected at a cost of about twelve thousand dollars.

At the University of Kansas, where this work has been in operation since 1907, I have to report the foundation of the following new fellowships, not yet published in SCIENCE:

10. *On the Chemical Treatment of Wood.*—$1,500 a year for 2 years. Large additional consideration. Fellow: L. V. Redman, Ph.D., University of Toronto.

11. *On New Utilities for Borax.*—$750 a year for 1 year. Fellow: B. C. Frichot, B.S., University of Kansas.

12. *On the Chemistry of Vegetable Ivory.*—$1,500 a year for 2 years. Maximum cash bonus of $2,000. Fellow: J. P. Trickey, A.B., New Hampshire College, University of Toronto.

13, 14. *On the Relation of Crude Petroleum to the Manufacture of Soap.*—$2,750 a year for 2

years. Maximum cash bonus of $5,000. Fellows: F. W. Bushong (senior fellow), Ph.D., former industrial fellow at University of Kansas; J. W. Humphreys (second fellow), A.M. University of Kansas.

15. *On the Chemistry of Gilsonite.*—$750 a year for 1 year. Maximum cash consideration of $2,000. Fellow: W. E. Vawter, A. B. University of Kansas.

16, 17, 18. *On the Chemical Treatment of Wood.*—$3,900 a year. Owing to the remarkable progress of fellowship No. 10 during the first year, the donating company extended its value to $3,900 a year and thus provided for the aid of two additional fellows. Fellows: L. V. Redman (senior fellow), Ph.D. University of Toronto; Frank P. Brock (second fellow), A.B. University of Kansas; Archie J. Weith (third fellow), A.B. University of Kansas.

Altogether, both at the University of Kansas and at the University of Pittsburgh, there have been so far involved $113,400 for direct expenditure in salaries in industrial research.

ROBERT KENNEDY DUNCAN

UNIVERSITY REGISTRATION STATISTICS

THE registration returns for November 1, 1911, of twenty-seven of the leading universities of the country will be found tabulated below. Seven institutions exhibit a decrease in the total enrollment (including the summer session) this year, viz., Chicago, Minnesota, Missouri, Nebraska, Northwestern, Texas and Yale, although in the case of Minnesota and Nebraska the apparent loss is due to a change of classification. The largest gains in terms of student units were registered by California (966), where the summer session showed an increase of 913 students, Columbia (527), Cornell (440) and

	Total Attendance[1] November 1, 1911	Attendance Summer Session, 1911	Grand Total	Deduct Summer Session Students who Returned in Fall	Net Total, November 1, 1911	Total, November 1, 1910	Total, November 1, 1908	Total, November 1, 1903
California	4051	1964	6015	291	5724	4758	3751	3690
Chicago	2666	3248	5914	524	5390	5883	5114	4146
Columbia	5669	2973	8642	704	79 .8	7411	5675	4557
Cornell	4889	1152	6041	432	5609	5169	4700	3438
Harvard (incl. Radcliffe)	4724	787	5511	85	5426	5329	5342	6013
Illinois	4570	647	5217	288	4929	4659	4400	3239
Indiana	1350	1068	2418	264	2154	2132	2113	1143
Iowa	1772	309	2081	114	1967	1957	2356	1260
Johns Hopkins	740	335	1075	18	1057	784	698	694
Kansas	2019	429	2448	183	2265	2246	2086	1319
Michigan	4783	1194	5977	525	5452	5339	5188	3926
Minnesota	4307	476	4783	235	4548[2]	4972	4607	3550
Missouri	2273	507	2780	184	2596	2678	2558	1540
Nebraska	2474	403	2877	144	2733[3]	3661	3154	2513
New York	3688	490	4178	123	4055	3947	3951	2177
Northwestern	3387	94	3481	43	3438	3543	3113	2740
Ohio State	3085	792	3877	310	3567	3181	2700	1710
Pennsylvania	4718	682	5400	180	5220	5187	4555	2644
Princeton	1543	—	1543	—	1543	1451	1314	1434
Stanford	1634	50	1684	36	1648	1648	1541	1370
Syracuse	3183	225	3408	101	3307	3248	3204	2207
Texas	1935	734	2669	130	2539	2597	1446	785
Tulane	1192	936	2128	88	2040	1985	1171	1037
Virginia	804	—	804	—	804	688	757	638
Western Reserve	1331	—	1331	—	1331	1274	1016	765
Wisconsin	3956	1536	5492	477	5015	4745	3876	3221
Yale	3224	—	3224	—	3224	3287	3466	2990

[1] In all faculties, excluding preparatory or extension department.

[2] These figures do *not* include the registration in the two branch schools of agriculture, nor in any of the short courses, some of which were included in the previous years. The actual attendance this fall is practically identical with that of 1910.

[3] Certain classes of students counted in previous years must have been omitted in the total for 1911, since the institution reports a gain over last year.