fer of acquired traits to the genome. When and if such an event affects germ cells, evolution might be advantaged and propelled by information gained not only by the life or death of individuals, but by the experience of those individuals.

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NIH Budget Grows, but not R01 Success Rates

THE PRINCIPAL SOURCE OF U.S. FUNDING FOR biomedical research has been the National Institutes of Health (NIH) and its main mechanism, the investigator-initiated, competitive, peer-reviewed R01 project grant. Data for funding such grants in fiscal year 2000 (*1*), just prepared by NIH for the National Caucus of Basic Biomedical Science Chairs (NCBBSC), are especially pertinent because during the past 2 years the NIH budget has increased by about 30%. Table 1 reveals, however, little change in success rates of unamended new or renewal R01 applications (unamended refers to the first submission, in contrast to results after all revisions).

In FY 2000, the total number of unamended R01 applications submitted to NIH grew only minimally (3.4% more new applications submitted, 2.7% more funded; 10.6% and

SUCCESS RATES FOR UNAMENDED NIH GRANT APPLICATIONS

	New R01s			New PAs		New RFAs		Renewal R01s		
NIH Institute*	Sub.	Fund.	SR (%)	Fund.	SR (%)	Fund.	SR (%)	Sub.	Fund.	SR (%)
AA	105	18	17.1	16	34.0	8	53.3	34	10	29.4
AG	373	64	17.2	18	15.5	28	31.8	84	29	34.5
AI	818	154	18.8	36	20.2	20	45.5	240	115	47.9
AR	242	36	14.9	23	22.1	**	31.6	77	39	50.6
AT	69	21	30.4	**	16.7	8	80.0	0	0	0
CA	1512	259	17.1	64	20.8	**	60.0	73	193	51.7
DA	213	51	23.9	18	22.0	36	37.5	84	42	50.0
DC	129	35	27.1	**	43.8	**	66.7	80	39	48.8
DE	136	25	18.4	**	14.7	18	27.3	44	12	27.3
DK	690	107	15.5	14	18.2	61	20.5	276	127	46.0
ES	172	27	15.7	9	28.1	22	32.4	50	22	44.0
EY	234	63	26.9	**	20.7	**	100	167	100	59.9
GM	996	235	23.6	29	29.9	10	13.9	612	345	56.4
HD	479	78	16.3	15	21.1	38	26.8	127	60	47.2
HG	**	**	29.6	**	42.9	**	40.0	13	10	76.9
HL	1097	245	22.3	24	19.5	96	39.3	359	207	57.7
MH	550	112	20.4	19	13.7	34	19.8	139	57	41.0
NR	73	20	27.4	**	9.1	8	57.1	**	**	23.1
NS	670	168	25.1	31	26.1	34	77.3	282	132	46.8
RR	**	**	11.4	**	7.7	0	0	**	**	28.6
Total										
FY 2000	8620	1730	20.1	348	21.0	444	29.9	3068	1546	50.4
FY 1998†	8337	1684	20.2	232	20.4	324	24.9	2774	1354	48.8
% increase over 2 years	3.4	2.7	0	50.0	2.9	37.0	20.0	10.6	14.2	3.3

* AA, National Institute on Alcohol Abuse and Alcoholism; AG, National Institute on Aging; AI, National Institute of Allergy and Infectious Diseases; AR, National Institute of Arthritis and Musculoskeletal and Skin Diseases; AT, National Center for Complementary and Alternative Medicine; CA, National Cancer Institute; DA, National Institute on Drug Abuse; DC, National Institute on Deafness and Other Communication Disorders; DE, National Institute of Dental and Craniofacial Research; DK, National Institute of Diabetes and Digestive and Kidney Diseases; ES, National Institute of Environmental Health Sciences; EY, National Eye Institute; GM, National Institute of General Medical Sciences; HD, National Institute of Child Health and Human Development; HG, National Human Genome Research Institute; HL, National Heart, Lung and Blood Institute; MH, National Institute of Mental Health; NR, National Institute of Nursing Research; NS, National Institute of Neurological Disorders and Stroke; and RR, National Center for Research Resources. **Denotes a small number. NIH has requested deletion because of privacy concerns. † Data for FY 1998 includes R01 and R29 applications.

Table 1. Data on initially submitted (i.e., unamended), unsolicited, competing NIH grant applications: new R01, new Program Announcement (PA) and Request for Application (RFA), and renewal R01 applications, and their funding success for FY 2000, by component NIH institutes. Data for FY 1998 are shown for comparison. If an amended R01 application is reviewed by NIH within the same fiscal year as the original, as happens in some 6% of cases, the fate of only the revised version is reported, thereby raising the apparent success rate for the initial application. Sub., submitted; Fund., funded; SR, success rate.

14.2%, respectively, for renewals). NIH budget growth over the past 2 years went largely to augment grant size, rather than to increase the number of new grants or renewals. In this interval, budgets of funded R01/R29 grants increased by 28.8% for new grants and 15.6% for renewals. Increments in the dollar amount of individual R01s are justified to compensate for cost-related inflation of science, repair of infrastructure, and purchase of major equipment, because it is unjust to investigators to provide insufficient funds to conduct planned research, as might have happened previously. However, grant size increases reduce the number of R01s that can be awarded. Applications must be carefully scrutinized to avoid undue escalation in budgetary requests, which the new modular budget concept might facilitate. Policies on growth of NIH grant support are complicated because initiation of multiyear grants creates commitments for outlying years, where NIH appropriations are uncertain (*2*).

SUCCESS RATES FOR AMENDED NIH GRANT REAPPLICATIONS

Application type	Amendment	Sub. or resub.	Fund.	SR (%)
New R01	Unamended	8620	1730	20.1
	First	3461	1163	33.6
	Second	917	406	44.3
New PA	Unamended	1658	348	21.0
	First	508	197	38.8
	Second	130	56	43.1
Renewal R01	Unamended	3068	1546	50.4
	First	1272	603	47.7
	Second	441	219	49.7

Table 2. Success rates before and after resubmission of competing new and renewal applications for R01 and PA applications for FY 2000. Abbreviations as in Table 1.

To help scientists estimate the probability that their initial R01 submission will be funded, the NCBBSC has been tracking the funding of unamended R01 applications since FY 1993. In previous publications in *Science* (*3–5*), we reported a slow, but steady, increase in success rates of new-start unamended R01 applications (Type 1), from 13.9% for FY 1994, to 18.0% in FY 1997, to 20.2% in FY 1998. In FY 2000, this rate remained at 20.1%. Accordingly, four of five applicants must reapply in the hope of initiating their projects (Table 2). In spite of recent NIH budget increases, prospects for funding a newly submitted R01 application remain unchanged.

For unamended renewal (Type 2) R01 applications, success rates, although higher, also remained essentially unchanged. For FY 1998, 48.8% of the study section–evaluated applications for competing renewal requests of ongoing projects, which previously had passed stringent peer review, were continued without interruption (*1*, *5*), compared with 50.4% for FY 2000. Again, with amended reapplications, success rates rise (Table 2), but without bridge funding from another source, research teams often break up during this hiatus, a wasteful process.

NIH has broadened and diversified funding mechanisms to fulfill its missions of preventing and treating disease, including clinical projects, common resources required by multiple investigators, and recognition of increasing varieties of scientific activity. For example, Program Announcements (PAs) are invited applications for targeted, limited programs, which NIH has peer reviewed together with R01s, because these mechanisms are closely related. Success rates for PAs and R01s were similar and remained constant, although the number of reported PA applications funded increased by 50% from FY 1998 to FY 2000. (There might be occasional difficulties in classifying PA and R01 applications.) Solicited applications (Request for Applications, RFAs) are invited to accomplish a specific program purpose. Funding is set aside for RFAs, which are reviewed separately from R01s and PAs. Funded RFAs increased by 37% between FY 1998 and FY 2000; success rates were 24.9% and 29.9%, respectively. Therefore, it appears that during this period, the relative increases in funded RFAs and PAs were greater than those for R01s (increases of 2.7% for new R01s, 14.2% for renewals, Table 1).

The peer-review process is essential to ensure excellence. However, if only minor revisions in an approved but unfunded application are required, the process should be accelerated to avoid long delays, and the reapplication process minimized. Grant reviewers we contacted expressed the opinion that with the increased quality of recently submitted applications, more should be funded, and delays reduced.

We recommend that, as additional funding becomes available to NIH, the number of new and renewal R01s be expanded. Such increases are justified by the enormous enhancement of scientific opportunities now available, largely through past NIH funding of R01s. Prior experience has indicated that the investigator-initiated research project (i.e., the R01) represents the best strategy for improved public health.

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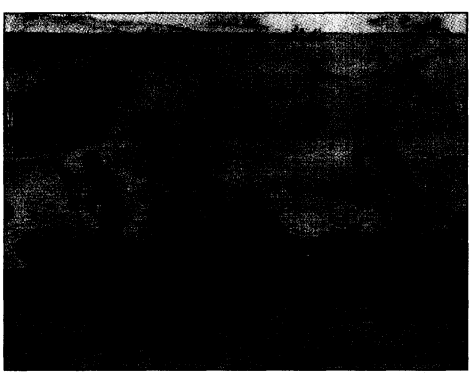
16th-Century Algonquian Fishermen

IN HIS LETTER ABOUT TWO ILLUSTRATIONS of Algonquians fishing in Pamlico Sound, Thomas M. Leschine compares a watercolor from 1585 by John White with an engraved version published by Theodor de Bry in 1590, reproduced respectively on the covers of *Science* (27 July) and *Oceanus* (summer 1981). Leschine says



Working the night shift in the 16th century.

CREDIT: PORTION OF AN ILLUSTRATION BY JOHN WHITE (1585)/COPYRIGHT, BRITISH MUSEUM PRESS

that, to him, "the real message of both illustrations is allegorical, embodied in the...image, dead center, of two humans seemingly intent upon burning a hole directly through the bottom of their canoe." (*Science*'s Compass, Letters, "Mixed messages from the distant past?", 14 Sept., p. 1993).

There is, however, a real message that is ethnographic and historical, as P. Hulton, D. B. Quinn, C. E. Raven, and I explained in the standard publication on White's watercolors and the de Bry derivatives (*1*). The fauna are there identified as to species, and the differences between the fish trap, or weir, shown in the two depictions are discussed, casting doubt on de Bry's version as compared with White's original.

According to contemporary sources, the small fire in the dugout canoe is a burning pile of "light-wood splinters, on a hearth built up nearly to the gunwales, which was used in night fishing to attract the fish and make visible the bottom of the river; the fish were then speared from the canoe" (*1*).

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References and Notes

1. P. Hulton, D. B. Quinn, *The American Drawings of John White, 1577-1590, with Drawings of European and Oriental Subjects.* Vol. I, *A Catalogue Raisonné and a Study of the Artist*, with contributions by W. C. Sturtevant, C. E. Raven, R. A. Skelton, L. B. Wright; Vol. II, *Reproductions of the Originals in Colour Facsimile and of Derivatives in Monochrome* (Trustees of the British Museum, London, and Univ. of North Carolina Press, Chapel Hill, NC, 1964); vol. I, pp. 102–103.

CORRECTIONS AND CLARIFICATIONS

BOOK REVIEWS: "Everyday impacts of a most influential theory" by T. H. Goldsmith (21 Sept., p. 2209). In the final paragraph on p. 2209, which discusses the evolutionary arms races, a typographical error changed the meaning of the fifth sentence. It should have read, "Such examples show viewers that evolutionary adaptations are frequently compromises."

THIS WEEK IN *SCIENCE*: "Trojan malaria" (14 Sept., p. 1951). Beginning with the second sentence, the text of the item was incorrect. It should have read: "Flick *et al.*... now describe how one of the malaria parasite proteins exposed at the infected red blood cell surface, PfEMP1, appears to bind to nonimmune immunoglobulins. The coated infected red cells can then adhere to placental cells via the placental immunoglobulin receptors."

PERSPECTIVES: "Top-down tectonics?" by D. L. Anderson (14 Sept., p. 2016). The illustrations were interchanged. Each should have been placed with the other's legend.

REPORTS: "Active normal faulting in the Upper Rhine Graben and paleoseismic identification of the 1356 Basel earthquake" by M. Meghraoui *et al.* (14 Sept., p. 2070). Degrees of latitude and longitude were incorrectly given in Figs. 1 and 2. On Fig. 1, the latitude should have been 48°, not 45°. On Fig. 2, the longitudes should have been 7.3° and 7.8°, not 7° and 7.5°, respectively.

NEWS FOCUS: "Defending deadwood" by K. Krajick (31 Aug., p. 1579). The citation of an article by aquatic scientist Robert Naiman was incorrect. The article appeared in the November 2000 issue of *BioScience*, not February 2001.