

Footnotes

(1/preface) Used here in the sense of NSF and the 1994 Carnegie Classification. See (16).
(2/preface) Public universities founded in each state by the Morrill Land Grant Act of July 2, 1862. See http://gnv2.ifas.ufl.edu/WWW/LS_GRANT/, for more.

(3/preface) Rhode Island Economic Policy Council. 1997. Meeting the Challenge of the New Economy: Keys to Building Hope. Annual Review 1997. 343 p.

(4/p. 1) In all that follows, we use the NSF convention of focusing on science and engineering, following NSF's defined fields (see <http://www.nsf.gov/sbe/srs/sgss/method99/xwalk.pdf> for crosswalk of fields with Nat. Ctr. for Educ. Stats. classification). NSF does not collect data for anthropology, linguistics, and history of science, nor do they include research expenditures in the fields of education, law, humanities, music, the arts, physical education, library science, or any other non-science and engineering fields. All NSF expenditure data are taken to be "the same as 'organized research' as defined in Section B.1.b of OMB Circular A-21, including all Research and Development activities of an institution that are *separately budgeted and accounted for* (ital. from NSF)." That is, the figures reported to NSF are from auditable university records and are assumed to be accurate.

(5/p. 2) State of Rhode Island. Annual Budget.

(6/p. 2) *ibid.*

(7/p. 3) URI's endowment, \$65 million in 2000, ranked 359th in the nation (Nat. Assoc. Col. & Univ. Bus. Off., 2000, www.nacubo.org).

(8/p. 3) RI Annual Budget. URI's 2000 state appropriation was 23.2% of its budget. The term "state-assisted university" has been used widely and in many states, generally referring to public universities with less than 25% of their funding coming from the state.

(9/pp. 3, 4, 5, 9, 20) National Science Foundation, WebCaspar (www.nsf.gov)

(10/p. 4) National Science Foundation. 2000. Science and Engineering Indicators 2000. (www.nsf.gov/sbe/srs/stats.htm.)

(11/p. 4) see, for example, Hovey, H. A. July 1999. "State Spending for Higher Education in the Next Decade: The Battle to Sustain Current Support." (www.highereducation.org/)

(12/p. 5) U.S. Dept. of Commerce, Census Bureau. 2000 Census. (www.census.gov)

(13/p. 5) U.S. Dept. of Commerce, Bureau of Economic Analysis. (www.bea.doc.gov)

(14/p. 5) *ibid.*

(15/p. 5) Illinois State University College of Education. Center for Higher Education and Educational Finance. Grapevine. (www.coe.ilstu.edu/grapevine) Appropriations of state tax funds for operating expenses of higher education, fiscal year 2000 (Revised). This material appears in the annual Almanac Issue of the Chronicle of Higher Education, published each September. Numbers reported were revised *after* the Chronicle issue of Sept. 1, 2000.

(16/p. 5) The Carnegie Foundation for the Advancement of Teaching erected the categories Research I and Research II in 1994. The distinction was based in part on total expenditures for science and engineering research, with cutoffs of >\$40million annually (inflation adjusted to 1992 \$'s) for Research I and >\$15million annually for Research II. NSF retains these distinctions in its WebCaspar database. In 2000, Carnegie began using an interim classification based on numbers of doctoral degrees awarded annually, replacing Research I & II with two new definitions:

Doctoral/Research Universities—Extensive: These institutions typically offer a wide range of baccalaureate programs, and they are committed to graduate education through the doctorate. During the period studied, they awarded 50 or more doctoral degrees per year across at least 15 disciplines.

Doctoral/Research Universities—Intensive: These institutions typically offer a wide range of baccalaureate programs, and they are committed to graduate education through the doctorate. During the period studied, they awarded at least ten doctoral degrees per year across three or more disciplines, or at least 20 doctoral degrees per year overall.

Carnegie speaks of a further overhaul in the classification system in 2005. In the

interim, we follow NSF and the 1994 system here, emphasizing relative amounts of research. (www.carnegiefoundation.org)

(17/p. 5) See www.nasulgc.org for listing. See the University of Florida's Institute of Food and Agricultural Sciences excellent site, gnv2.ifas.ufl.edu/WWW/LS_GRANT/, for more information on land grants, sea grants, legislation, and history.

(18/p. 5) See, for example, URI Marine and the Environment Focus Group: Library Committee. Nov. 9, 1999. Report on Marine & the Environment Focus Group (MEF) Library Issues (www.gso.uri.edu/pell/mefj11999.pdf)

(19/ p. 9) NSF. "Federally financed separately budgeted R&D expenditures in the sciences and engineering, by field: selected years." For an individual institutional profile, see <http://www.nsf.gov/sbe/srs/profiles/toc.htm>, which allows you to select any research university. For a profile of URI, for example, see <http://www.nsf.gov/sbe/srs/profiles/data/ip003414.htm>.

(20/p. 12) The \$500 cutoff may be old. URI currently uses a \$2500 limit on individual items of equipment to differentiate between expendable equipment (e.g., a \$2000 personal computer) and capital equipment (e.g. a \$20,000 scintillation counter).

(21/p. 12) See <http://www.nsf.gov/sbe/srs/pubdata.htm>. Additional useful information can be obtained from within the WebCaspar online data system through online help, describing variables, data source, description, availability, estimation/imputation methods, data limitations, and quality control. See <http://caspar.nsf.gov/webcaspar>: use the "institutional data" tab, log in as an anonymous user, select "search," enter the name of any university, select any data source, then click on the help icon for data description, etc.

(22/p. 13, 14, 17) National Science Foundation, Division of Science Resources Studies, "Scientific and Engineering Research Facilities at Colleges and Universities, 1998, NSF 01-301. (published October 2000. See <http://www.nsf.gov/sbe/srs/nsf01301/start.htm>). Also published in part in "Indicators" (see 10).

(23/p. 13) For a current ranking based on expenditure data, see <http://www.nsf.gov/sbe/srs/profiles/data/erank.htm>. For a current ranking based on obligations (i.e., grants awarded in the most recent fiscal year) see [.../data/crank.htm](http://www.nsf.gov/sbe/srs/profiles/data/crank.htm). URI currently ranks 136 (out of 615) in total R&D expenditures (1999) and 122 (out of 1531) in S&E obligations (i.e., 1999 grants). If URI doubled its research expenditures, it would enter the Top 100, displacing the University of Alaska for 97th place. Without Oceanography, the rest of URI would rank 178, just ahead of the Desert Research Institute of Nevada.

(24/p. 13) URI figures here were imputed by NSF based on URI 1999 data submitted 8/15/00: Source NSF/SRS, L. Christorch, pers. comm. 8/9/01 via URI Research Office. (see also, 22)

Planned URI construction projects for 1998/99 included expansion of the psychology cancer prevention research center (completed 2000) and the Coastal Institute Building (completed 2000). Planned URI renovation projects for 1998/99 included renovation of Ranger Hall (\$4.5 million), which has not begun as of this writing: the figure as presented thus overstates actual renovation by \$4.5 million.

(25/p. 14) Net assignable square feet is determined every two years by each research institution, based on the relative amount of activity for major functions (teaching, research, etc.) in each space (office, laboratory, common rooms, etc.) of the university. The use determination is used to calculate allowable indirect costs for the university, and it is auditable.

(26/p. 15, 16) Source of URI data is NSF/SRS, pers. comm. 8/9/01 via URI Research Office. Source of national data is Scientific and Engineering Research Facilities: 1999, NSF 01-330, Table 6, "Quality of academic science and engineering research space, by field: 1999.

(27/p. 17) The \$10 million total new construction in environmental plus agricultural sciences was the approximate total cost of the Coastal Institute Building, completed in December 2000, which includes at least half office and instructional space (i.e., the space assignable to research may be overstated in **Table 8**). The \$4.6 million for renovations in biological sciences was the original total cost of renovating Ranger Hall, which also overstates the space assignable to research (Ranger is exclusively used for teaching and nonsponsored research and its use after

renovation is still undetermined): this project was approved by a state bond in 1996 but a required \$1million match (part of the \$4.6 million), to be raised by the University: fund raising has not started and the voter-approved project remains on hold five years after approval. The 2002 bond issue has not been set and it is possible that the biotechnology building may be postponed to 2004.

(28/p. 19) Latest available data include expenditures for 1996-97 and anticipated expenditures for 1998-99 (i.e., estimates before the fact). (See 22, tables 5-2 (Construction at public institutions) and 5-5 (Renovation at public institutions)).

(29/p. 20) National Science Foundation, Division of Science Resources Studies, Academic Research and Development Expenditures: Fiscal Year 1999. NSF 01-329. (See also <http://www.nsf.gov/sbe/srs/stats.htm>).

(30/p. 20) Note, however, that the top 100 include at least one-third private institutions, which traditionally draw little state money for either renovations or construction.

(31/p. 20) The important issue of mandatory match requirements for federal equipment funds needs further study. Most agencies expect a large portion of the funding to come from state or institutional sources, typically 30 - 50% of total costs. This has clearly inhibited some URI faculty from applying to major NSF or other agency equipment programs, because they believe that they will be unable to secure required match from the institution.

(32/p. 22) Geiger, R. L. 1993. **Research and Relevant Knowledge: American Research Universities Since World War II**. Oxford U. Press, 411 p.

(33/p. 22) *ibid.* See Geiger's account of the rise of the University of Arizona, which began by building on the unique opportunities to study climate and astronomy afforded by AU's geography (cpt. 9).

(34/p. 22) For examples, see the 1998 URI Academic Plan (http://www.uri.edu:80/Academic_Plan/index_98.html) or the 2001 Three-Year Strategic Plan, "Balancing Mission with Resources" (http://www.uri.edu:80/spir/@planning/strategic_plan/index.html).

Compare these to the Michigan Economic Development Corporation (MEDC) Michigan Life Sciences Strategy, which outlines a plan to develop its universities, industries, and infrastructure to nurture biotechnology entrepreneurship over the next decade. In developing the strategy, MEDC conducted three studies: a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis; a comparative analysis of competitor states and best practices in public biotech programs; and a situational analysis of Michigan's current portfolio of programs and activities related to life sciences. The best practices and comparison analysis are drawn from Maryland and North Carolina. (See <http://medc.michigan.org/> and click on "Michigan Life Sciences Corridor.")

(35/p. 23) **Outcome Funding**, A New Approach to Targeted Grantmaking by Harold S. Williams, Arthur Y. Webb and William J. Phillips (©The Rensselaerville Institute, 250 pages, paperback) (see <http://www.tricampus.org/index.html>)

See, for example USDA's current Plan of Work process, under the 1998 Farm Bill (<http://www.reeusda.gov/part/areera/amain.htm>). Each state is to identify stakeholder input processes, to identify target audiences for all programs, to specify outcomes of each program, etc. Failure to include outcomes as a part of the planning process can result in withheld funds for USDA's Agricultural Experiment Station and Cooperative Extension at each land grant university. See also, NSF's strategic plan, again based on outcomes (<http://www.nsf.gov/pubs/2001/nsf0104/start.htm>).

(36/p. 23) Engineering Research Centers (see www.nsf.gov/pubs/2000/nsf00137/start.htm).

(37/p. 23) Industry/ University Cooperative Research Centers (see www.eng.nsf.gov/iucr/Centers/centers.htm).

(38/p. 23) Materials Research Science and Engineering Centers (see www.nsf.gov/mps/divisions/dmr).

(39/p. 23) The Environmental Biotechnology Initiative was initially proposed by faculty in 1999. See <http://www.riaes.org/biotech/biotech.html>

(40/p. 23) Note that Genentech, the first firm to be based explicitly on genetic engineering,

was founded by UC San Francisco scientist Herbert Boyer in 1976.

(41/p. 24) An excellent primer on Bayh-Dole and other aspects of Technology Transfer is the 1999 Council on Governmental Relations document, "A Tutorial on Technology Transfer in U.S. Colleges and Universities" (download at www.cogr.edu).

(42/p. 24) A survey summary is downloadable from www.autm.net.

(43/p. 26) Geiger, *op. cit.*

(44/p. 26) <http://web.mit.edu/newsoffice/founders/>

Dr. Patrick Logan is Professor of Entomology at the University of Rhode Island. He holds a BA in English and MS and PhD degrees in Entomology from Michigan State University. He has been at URI since 1976. Following an active research career from 1976 to 1992, Dr. Logan served eight years in administration, as Associate Dean of the College of Resource Development and Associate Director of the RI Agricultural Experiment Station, then five years as Director of the Experiment Station, with two concurrent years as Director of RI Cooperative Extension. In 1999, Dr. Logan wrote "Reinventing the Research University: A Blueprint for the University of Rhode Island," which led to the present study. Dr. Logan presently teaches and writes in Kingston.