



The

# nature

# YEARBOOK

of science and technology

Edited by Declan Butler

**2001**



## CONTENTS

<p><b>PREFACE</b> by Declan Butler, Editor</p> <p><b>FOREWORD</b> by Philip Campbell, Editor of Nature</p> <p><b>CHRONOLOGY</b></p> <p><b>PART 1. MILLENNIUM INSIGHTS</b></p> <p><b>Biology Enters the Post Genome Era</b> <i>The Year the Human Genome Was Sequenced</i> by John Sulston Human Genome Projects: Work in Progress (Nature) World Leaders Heap Praise on Human Genome Landmark by Colin Macilwain (Nature) <i>The Story So Far</i> by David Dickson (Nature) <i>Draft Data Leave Geneticists with a Mountain Still to Climb</i> by Declan Butler and Paul Smaglik (Nature) <i>Crop Plant Genomes Yield Huge Prospects</i> by John Quackenbush A Brief History of Genetics (Nature)</p> <p><b>Science and Society</b> Genomics in the Public Domain: Strategy and Policy by Rebecca S. Eisenberg (Nature Reviews Genetics) An Overview of Structural Genomics by Stephen K. Burley (Nature Structural Biology) <i>Molecular Breeding by DNA Shuffling; A Revolution in Evolution?</i> by Willem P.C. Stemmer Human Stem Cells Come of Age by Ron McKay</p> <p><b>Waking Up to the Challenge of Neglected Killer Diseases</b> <i>Health as a Human Right</i> by Ralph Nader <i>AIDS: In and Out of Africa</i> by Declan Butler <i>The Durban Declaration</i> (Nature) <i>New Fronts in an Old War</i> by Declan Butler (Nature)</p>	<p>xiii</p> <p>xvii</p> <p>I</p> <p>II</p> <p>13</p> <p>13</p> <p>18</p> <p>20</p> <p>21</p> <p>24</p> <p>26</p> <p>28</p> <p>29</p> <p>29</p> <p>37</p> <p>43</p> <p>48</p> <p>51</p> <p>51</p> <p>55</p> <p>57</p> <p>60</p>	<p><i>Malaria Vaccine Development: Status Report</i> by Stephanie James and Louis Miller (Nature Medicine)</p> <p><i>Balancing Risks on the Backs of the Poor</i> by Amir Attaran, Donald R. Roberts, Chris F. Curtis and Wenceslaus L. Kilama (Nature Medicine)</p> <p><b>Next Generation Scientific Computing</b> <i>The 'Grid'; Life After the Web</i> by Ian Foster <i>Big Computing Comes to Biology</i> by George Lake and Leroy B. Hood <i>Reinventing Access to Scientific Literature</i> by Steve Lawrence</p> <p><b>Weapons of Mass Destruction Loom Over Millennium</b> <i>The Future of Nuclear Weapons</i> by Richard L. Garwin <i>Nuclear Powers on the Brink</i> by Rebecca Johnston <i>Sowing Nuclear Misconceptions</i> by Kurt Gottfried (Nature) <i>Preventing Deliberate Disease</i> by Graham S. Pearson <b>Organizations Involved in Disarmament Issues</b></p> <p><b>Nobels</b> <i>Medicine Nobel Goes to Raiders of the Brain's Chemical Secrets</i> by Alison Abbott (Nature) <i>Fathers of Electronic Revolution Are Rewarded</i> by Liesbeth Venema (Nature) <i>Plastics that Conduct Win Inventors Chemistry Prize</i> by David Adam (Nature)</p> <p><b>PART 2. INTERNATIONAL ORGANIZATIONS</b> <i>Climate Change Talks End in Disarray</i> <i>Biodiversity Convention Searches for Identity,</i> articles by Ehsan Masood</p>	<p>65</p> <p>74</p> <p>79</p> <p>82</p> <p>86</p> <p>89</p> <p>89</p> <p>96</p> <p>99</p> <p>104</p> <p>109</p> <p>117</p> <p>117</p> <p>119</p> <p>121</p> <p>123</p> <p>125</p> <p>126</p>
--	--	--	--

Concern as Germany Cuts Funds to Agricultural Research Centres by Quirin Schiermeier, Rex Dalton and Colin Macilwain (Nature)	144	Reactor Refit Ignites Debate on Japan's Fusion Strategy by Robert Triendl (Nature)	335
Enhanced Advisory Role Urged for Former EU Nuclear Labs by Quirin Schiermeier (Nature)	154	When Peer Review Fails by Stephen Bodner and Christopher Paine (Nature)	338
Strategy for Framework 6 (Nature)	159	Laser Facilities	344
Europe Edges Closer to an Integrated Science Policy by Quirin Schiermeier (Nature)	160	Neutrino Facilities	345
Britain Asks to Join European Southern Observatory by David Dickson and Alison Abbott (Nature)	175	Neutron Sources	347
European Space Panel Picks New Priorities by Alison Abbott (Nature)	178	Research Reactors	354
World's Academies Seek a Sustainable Future by Robert Triendl (Nature)	188	Synchrotron Radiation Facilities	356
Providing Support and a Voice for Europe's Young Researchers by Natasha Loder (Nature)	234	France Finally Picks Parisian Site for New Synchrotron by Declan Butler (Nature)	356
UNESCO "Worse Than I Imagined," Says New Director by Natasha Loder (Nature)	257	Northern Lobby Attacks UK Synchrotron Siting by Natasha Loder (Nature)	358
UNESCO Backs 'Science for Debt' Plan by David Dickson (Nature)	259	PART 4. COUNTRY GUIDE	375
<b>PART 3. LARGE SCIENTIFIC FACILITIES</b>	277	AFGHANISTAN	377
Research Infrastructure is 'Key Foundation' of a 'European Research Area' by Pierre Papon	279	ALBANIA	378
Europe Boosts Genome Resource Centres . . . by Alison Abbott (Nature)	282	ALGERIA	379
Deep Thoughts by Rex Dalton (Nature)	284	ANDORRA	381
<b>Accelerator Facilities</b>	289	ANGOLA	383
Promise of Higgs Fails to Save CERN Collider by Alison Abbott (Nature)	289	ANTIGUA AND BARBUDA	385
Brookhaven Collider Opens Its Quest for Big Bang Conditions by Steve Nadis (Nature)	298	ARGENTINA	387
<b>Astronomy Facilities</b>	301	Argentinian Researchers Fight Government Plans for Reform by Xavier Bosch (Nature)	387
Does Size Matter? By Alexander Hellemans (Nature)	301	ARMENIA	392
US Astronomers Draw Up Their Wish List for a Decade of Funding by Tony Reichhardt (Nature)	306	AUSTRALIA	400
Requiem for an Observatory by Henry Bortman (Nature)	308	Made in Australia by Peter Pockley	400
The Sky's the Limit as Radio Telescope Array is Approved by Steve Nadis (Nature)	313	AUSTRIA	464
Green Bank Dish May Be Last of the Giants by Colin Macilwain (Nature)	318	AZERBAIJAN	479
Report Praises European Radio Telescope Network by Alison Abbott (Nature)	323	BAHAMAS	482
A Hundred Million Points of Light by Govert Schilling (Nature)	327	BAHRAIN	484
<b>Gravitational-Wave Detectors</b>	331	BANGLADESH	486
<b>Fusion and Plasma Research Facilities</b>	334	BARBADOS	489
Partners Edge Closer to Vital Step on Fusion by Quirin Schiermeier (Nature)	334	BELARUS	491
		BELGIUM	498
		BELIZE	509
		BENIN	511
		BHUTAN	513
		BOLIVIA	514
		BOSNIA AND HERZEGOVINA	517
		BOTSWANA	519
		BRAZIL	522
		A Springboard to Success by Colin Macilwain and Ricardo Bonalume Neto (Nature)	522
		BRUNEI	536
		BULGARIA	538
		BURKINA FASO	546
		BURUNDI	549

GAMBODIA	551	FRANCE	804
GAMEROON	553	Napoleon 'Alive and Well' in French Science by Olivier Postel-Vinay	804
CANADA	556	Europe's Largest Science Agency Looks to the Future by Declan Butler (Nature)	814
Optimism Sweeps Canadian Science	556	Pasteur Institute to Abandon Departmental Structure? By Declan Butler (Nature)	822
Making an Art of Science Policy	560	GABON	839
New Institutes Adopt Pioneering Approach to Health	565	THE GAMBIA	841
Unprecedented Gift Boosts Basic Physics in Canada, articles by David Spurgeon (Nature)	583	GEORGIA	843
CAPE VERDE	602	GERMANY	850
CENTRAL AFRICAN REPUBLIC	603	Science After Reunification by Christina Hohmann	850
CHAD	605	The Missionary from Munich by Alison Abbott (Nature)	859
CHILE	606	GHANA	918
CHINA	610	GREECE	920
Chinese Science Goes to Earth by David Cyranoski (Nature)	612	GRENADA	925
Hong Kong	639	GUATEMALA	927
Taiwan	641	GUINEA	929
Taiwan Backs Experience in Quest for Biotech Success by David Swinbanks and David Cyranoski (Nature)	641	GUINEA-BISSAU	931
Stepping Out From the Semiconductor Shadow (Nature)	648	GUYANA	932
Building a Progressive Sci-tech Island (Nature)	649	HAITI	935
A Science Giant Rises Out of the Rice Fields, articles by David Cyranoski (Nature)	650	HONDURAS	937
COLOMBIA	702	HUNGARY	939
COMOROS	710	ICELAND	953
CONGO, DEMOCRATIC REPUBLIC OF THE	711	INDIA	959
CONGO, REPUBLIC OF THE	713	India: Building on Nehru	959
COSTA RICA	715	India's Finest, for Hire (Nature)	963
COTE D'IVOIRE	718	India and US Bring Collaboration Out of the Freezer, articles by K.S. Jayaraman (Nature)	965
CROATIA	720	INDONESIA	989
CUBA	733	IRAN	993
CYPRUS	738	IRAQ	996
CZECH REPUBLIC	741	IRELAND	998
DENMARK	754	Ireland in Science and Technology 'Renaissance' by Peter Mooney	998
THE FAROE ISLANDS	768	ISRAEL	1012
DJIBOUTI	770	Israel Looks to Europe	1012
DOMINICAN REPUBLIC	772	The Organization of Science in Israel, articles by Haim Watzman	1015
ECUADOR	774	Palestinian-Administered Territories	1031
EGYPT	776	ITALY	1034
EL SALVADOR	780	JAMAICA	1047
EQUATORIAL GUINEA	782	JAPAN	1051
ERITREA	784	Japanese Science Triumphs Despite Neglect by David Swinbanks	1051
ESTONIA	785	JORDAN	1120
ETHIOPIA	792	Middle East's Synchrotron Heads for Jordan by Heather McCabe (Nature)	1120
FIJI ISLANDS	794		
FINLAND	796		

KAZAKHSTAN	1123	Niue	1250
KENYA	1125	NICARAGUA	1251
KIRIBATI	1129	NIGER	1253
KOREA (SOUTH)	1130	NIGERIA	1255
KUWAIT	1142	NORWAY	1257
KYRGYZSTAN	1144	OMAN	1265
LAOS	1146	PAKISTAN	1267
LATVIA	1148	Pakistan Seeks to Reinstate Science	
LEBANON	1152	by Ehsan Masood	1267
LESOTHO	1154	PALAU	1294
LIBERIA	1156	PANAMA	1295
LIBYA	1157	PAPUA NEW GUINEA	1297
LIECHTENSTEIN	1158	PARAGUAY	1299
LITHUANIA	1159	PERU	1301
LUXEMBOURG	1162	PHILIPPINES	1307
MACEDONIA	1165	Science in the Philippines Struggles to Survive	1307
MADAGASCAR	1167	POLAND	1314
MALAWI	1170	Poland's Poor Prognosis by Marcin Szwed	1314
MALAYSIA	1172	PORTUGAL	1332
MALDIVES	1177	QATAR	1348
MALI	1180	ROMANIA	1350
MALTA	1182	RUSSIA	1354
MARSHALL ISLANDS	1184	Russia: Confidence Despite Adversity	
MAURITANIA	1185	by Bryon MacWilliams	1354
MAURITIUS	1187	Responses to Alferov (Nature)	1358
MEXICO	1189	Russia's Prize Fighter by Quirin Schiermeier	
Mexican Science Waits to See If Election		(Nature)	1360
Promises Are Met by Marina Chicurel		RWANDA	1424
(Nature)	1189	ST. KITTS AND NEVIS	1426
Political Uncertainty Halts Bioprospecting in		ST. LUCIA	1428
Mexico by Rex Dalton (Nature)	1191	ST. VINCENT AND	
MICRONESIA	1198	THE GRENADINES	1429
MOLDOVA	1199	SAMOA	1430
MONACO	1201	SAN MARINO	1431
MONGOLIA	1202	SÃO TOMÉ E PRÍNCIPE	1432
MOROCCO	1204	SAUDI ARABIA	1433
MOZAMBIQUE	1208	SENEGAL	1436
MYANMAR	1210	SEYCHELLES	1438
NAMIBIA	1212	SIERRA LEONE	1439
NAURU	1215	SINGAPORE	1440
NEPAL	1216	SLOVAKIA	1447
NETHERLANDS	1218	SLOVENIA	1449
Aruba	1231	SOLOMON ISLANDS	1453
Netherlands Antilles	1232	SOMALIA	1454
NEW ZEALAND	1233	SOUTH AFRICA	1455
New Zealand Fights Brain Drain		Science After Apartheid by Michael Cherry	1455
by Peter Pockley	1233	SPAIN	1478
NZ TERRITORIES OVERSEAS	1250	Spain Gets a Science Ministry by Xavier	
Cook Islands	1250	Bosch	1478

SRI LANKA	1507	Alaska	1678
SUDAN	1511	Arizona	1679
SURINAME	1513	Arkansas	1684
SWAZILAND	1514	California	1686
SWEDEN	1516	Colorado	1725
<i>Sweden Streamlines Research Administration</i>		Connecticut	1732
by Declan Butler (Nature)	1516	Delaware	1735
SWITZERLAND	1527	District of Columbia	1735
SYRIA	1544	Reinventing NASA by Tony Reichhardt	1759
TAJIKISTAN	1546	Florida	1765
TANZANIA	1548	Georgia	1771
THAILAND	1550	Hawaii	1775
TOGO	1558	Idaho	1776
TONGA	1560	Illinois	1779
TRINIDAD AND TOBAGO	1561	Indiana	1790
TUNISIA	1564	Iowa	1791
TURKEY	1566	Kansas	1794
TURKMENISTAN	1572	Kentucky	1798
TUVALU	1574	Louisiana	1800
UGANDA	1575	Maine	1805
UKRAINE	1578	Maryland	1808
UNITED ARAB EMIRATES	1583	Massachusetts	1846
UNITED KINGDOM	1585	Michigan	1867
Great Britain	1585	Minnesota	1871
<i>Seeking Consensus in the Knowledge-Based</i>		Mississippi	1875
<i>Economy by David Dickson</i>	1585	Missouri	1877
<i>Britain Plumps for Support of Big Projects</i>		Montana	1879
by Peter Aldhous (Nature)	1589	Nebraska	1881
... But ESO Membership Comes at a		Nevada	1883
Price	1590	New Hampshire	1884
England	1592	New Jersey	1886
<i>A Question of Trust by Natasha Loder</i>		New Mexico	1890
(Nature)	1623	<i>Science-based Security Under Threat</i>	
Scotland	1632	by David Pines (Nature)	1890
Wales	1637	New York	1898
UK OVERSEAS TERRITORIES	1640	North Carolina	1926
Bermuda	1640	North Dakota	1933
UNITED STATES	1641	Ohio	1934
<i>The Development of US Postwar Science</i>	1641	Oklahoma	1940
<i>The Science Agencies</i>	1644	Oregon	1943
<i>Research at Universities</i>	1651	Pennsylvania	1947
<i>Research in Government Laboratories</i>	1654	Rhode Island	1959
<i>Industrial Research</i>	1657	South Carolina	1960
<i>The Governance of Research</i>	1660	South Dakota	1961
<i>Science in Society</i>	1663	Tennessee	1962
<i>Science Education and Personnel</i>	1665	Texas	1969
<i>US Science: The Year in Review</i>		Utah	1975
articles edited by Colin Macilwain	1667	Vermont	1977
Government Offices and Agencies	1671		
Alabama	1675		

Virginia	1978	Paul Sigler (1934–2000) by Brian W. Matthews	2077
US Geological Survey Needs More Resources, Says Draft Report by Rex Dalton (Nature)	1979	Robert Rathbun Wilson (1914–2000) by Alvin V. Tollestrup	2079
NSF Celebrates Half a Century with Big Plans by Colin Macilwain (Nature)	1984	George Ledyard Stebbins (1906–2000) by Vassiliki Betty Smocovitis	2081
Washington	2007	William Donald Hamilton (1936–2000) by Robert Trivers	2083
West Virginia	2010	Jane Gray (1929–2000) by William A. Shear	2085
Wisconsin	2011	Kent R. Wilson (1937–2000) by Dudley Herschbach	2087
Wyoming	2012	Seymour S. Kety (1915–2000) by Leon Elsenberg	2089
PACIFIC TERRITORY		W. David Kingery (1926–2000) by Richard J. Brook	2091
Puerto Rico	2013	Elsie Widdowson (1906–2000) by Margaret Ashwell	2093
OUTLYING TERRITORY	2013	Elvin A. Kabat (1914–2000) by William E. Paul and Rose G. Mage	2095
Virgin Islands	2013	Mark Oliphant (1901–2000) by Joseph Rotblat	2097
URUGUAY	2014	Robert H. Abeles (1926–2000) by Lizbeth Hedstrom and Perry A. Frey	2099
UZBEKISTAN	2017		
VANUATU	2023		
VATICAN CITY STATE	2025		
VENEZUELA	2026		
VIETNAM	2030		
YEMEN	2033		
YUGOSLAVIA	2035		
ZAMBIA	2039		
ZIMBABWE	2044		
PART 5. JAPAN, THE UNITED STATES, AND THE EUROPEAN UNION: AN INTERNATIONAL COMPARISON	2049		
The State of World Science by Rémi Barré and Pierre Papon	2051		
PART 6. OBITUARIES (NATURE)	2061		
Arthur James Cain (1921–99) by Bryan Clarke	2063		
Guido Pontecorvo (1907–99) by Obaid Siddiqi	2065		
Charles M. Steinberg (1932–99) by Jack Von Borstel and John Cairns	2067		
Thomas Hughes Jukes (1906–99) by John Maddox	2069		
Johannes A. van Paradijs (1946–99) by Edward Van Den Heuvel	2071		
Olivier Kahn (1943–99) by Peter Day	2073		
Dennis Sciama (1926–99) by George F.R. Ellis	2075		
PART 7. DAEDALUS BY DAVID JONES (NATURE)	2101		
Chain in Miniature	2103		
Coal, Air, Fire and Water	2104		
Direct Illumination	2105		
The Sharper Image	2106		
Drink Without Drinking	2107		
Green Smelters	2108		
Jet-Age Cleaning	2109		
The Soda Solution	2110		
Spinning and Leaking	2111		
Shuffling Around	2112		
Cleaning the Cleaner	2113		
The Sound of Silence	2114		
PART 8. APPENDICES	2115		
Total R&D Expenditures at US Universities and Colleges: Fiscal Years 1991–1998 (National Science Foundation)	2117		
Worldwide Academic R&D Expenditures: Fiscal Year 1998 (National Science Foundation)	2123		