187 This Week in Science

Editorial

189 The Rational Approach to the Irrational

Letters


News & Comment


201 OTA Quietly Backs Fetal Tissue Work

202 Gallo Inquiry Takes Puzzling New Turn

203 Tobacco Industry Does Slow Burn Over EPA Adviser

204 Briefings: NIH Watch ■ Celebrating the Leech ■ Anti-Asian Bias Seen at UCLA ■ Fusion Fans Keep Fighting ■ Skepticism Urged on Soviet Psychiatry ■ Unraveling Rembrandt ■ Demolishing the Layer Cake

Research News

206 The High Culture of Neuroscience

208 Astrophysics in the Abyss

209 All Worked Up About Buckyballs

210 Mapping Terra Incognita (Humanus)

213 Warm Waters, Bleached Corals

Articles

223 Sources of Human Psychological Differences: The Minnesota Study of Twins Reared Apart: T. J. BOUCHARD, JR., D. T. LYKKEN, M. McGUE, N. L. SEGAL, A. TELEGÉN

229 Transient Particle Acceleration Associated with Solar Flares: E. L. CHUPP


Research Article


Reports

263 Chaotic Motion of Europa and Ganymede and the Ganymede-Callisto Dichotomy: W. C. TITTMORE

THE HUMAN GENOME MAP 1990

Pullout chart appearing on pages 262 a-p
267 A Plant Leucine Zipper Protein That Recognizes an Abscisic Acid Response Element: M. J. GUILLITNNAN, W. R. MARCOTTE, JR., R. S. QUATRANO

271 Cleaving Yeast and Escherichia coli Genomes at a Single Site: M. KOOB AND W. SZYBALKSI

274 Reversible Root Tip Rotation in Arabidopsis Seedlings Induced by Obstacle-Touching Stimulus: K. OKADA AND Y. SHIMURA

276 Mutations Affecting TEL Blockade and Ion Permeation in Voltage-Activated K⁺ Channels: R. MACKINNON AND G. YELLEN

279 Neurotrophic and Neurotoxic Effects of Amyloid β Protein: Reversal by Tachykinin Neuropeptides: B. A. YANKNER, L. K. DUFFY, D. A. KIRSCHNER


285 A Magnesium Current in Paramecium: R. R. PRESTON

288 The Primate Hippocampal Formation: Evidence for a Time-Limited Role in Memory Storage: S. M. ZOLA-MORGAN AND L. R. SQUIRE

290 Widespread Expression of BDNF But Not NT3 by Target Areas of Basal Forebrain Cholinergic Neurons: H. S. PHILLIPS, J. M. HAINS, G. R. LARAMEE, A. ROSENHAL, J. W. WINSLOW

294 Induction of a Neuronal Proteoglycan by the NMDA Receptor in the Developing Spinal Cord: R. G. KALB AND S. HOCKFIELD

Technical Comment


Inside AAAS

299 Mesoamerican Forests ■ AAAS VISA® Gold Member Benefit ■ Large Marine Ecosystems ■ Proyecto Futuro ■ Council Deadline ■ Art and Science ■ Last Chance for Poster Papers ■ Larus Competition in Caribbean ■ Carey Graduate Student Award

Book Reviews

303 SETI Pioneers, reviewed by W. T. SULLIVAN III ■ The Triune Brain in Evolution, A. REINER ■ Some Other Books of Interest ■ Books Received

Products & Materials

310 Chemistry Spell Checker ■ Automated GC Unit ■ Antibodies ■ Software for Characterizing Proteins ■ Accessories to Preserve and View Gels ■ Grip Strength Meter for Mice and Rats ■ Micro-Incubation System ■ Literature
The Rational Approach to the Irrational

Last week a crazed gunman terrorized hostages in a bar in Berkeley, killing one and wounding many others. Homicidal maniacs have appeared in all cultures over the entire length of human history. Society's modern response to their chaotic behavior has most often been a diligent search of their childhoods, as though understanding their upbringing and circumstances would explain their aberrant actions. There is nothing wrong with that kind of investigation, and in some cases history and environment will reveal clues. However, it is time the world recognized that the brain is an organ like other organs—the kidney, the lung, the heart—and that it can go wrong not only as the result of abuse, but also because of hereditary defects utterly unrelated to environmental influences. Some inherent defects may be exacerbated by environmental conditions, but the irrational output of a faulty brain is like the faulty wiring of a computer, in which failure is caused not by the information fed into the computer, but by incorrect processing of that information after it enters the black box.

This issue of Science is illustrative of the kinds of research that can offer great help to society in this area. Today research in the social sciences is flourishing, as exemplified by eight reports that span the area from molecular manipulation of ion channels to a study of primate behavior to a study of human twins. This rapid progress is aided by advances in the social sciences in general and the advent of three major new tools. The first is genetic engineering, and the second, the noninvasive physical probes for imaging the brain. The third is the Human Genome Project, which will provide information of particular value to the study of the neurosciences. The ability to combine analyses of structural changes in the genome with family histories has already provided valuable insights into neurological disorders, of which Huntington's disease, neurofibromatosis, and Alzheimer's disease are only a few examples. There are legitimate arguments in regard to how fast such a project should go or how it should be administered, but there seems to be little doubt that it will help in the mental health area. Schizophrenia (the disease from which the Berkeley gunman is thought to have suffered) and other major mental illnesses can have a multigenic origin. A sequenced human genome will be a very important tool for understanding this precise category of diseases.

As a special feature in this issue, Science presents a human genome map that can be used as a wall chart, together with an accompanying article by J. C. Stephens et al. This map, which records the state of the art in sequencing, mapping, probes, and polymorphisms will not only allow researchers in the field to identify their own particular opportunities, but keep others abreast of the rapid advances in this area. An article in the Research News section illustrates the history that has brought us to this point in discovery. Technological advances in genome analysis are also described in scientific papers in this issue.

As we extend the life expectancy of individuals and provide cures for infectious diseases, the affliction of mental disease becomes more glaring. Advancing research can cure some fraction of these illnesses. It may also provide predictive diagnoses to distinguish those who are severely ill from those who merely represent harmless aberrations from the norms of society. The article on identical twins reared apart shows that some physiological and psychological traits are inherited; however, this does not minimize the influences of environment and motivation. While some inherited illnesses cannot be alleviated without a biochemical cure, in others there is only a tendency to disease, which can be ameliorated or prevented by a helpful environment.

The combination of new tools may not only let us help in reducing crime, but also aid some of our most disadvantaged citizens, the mentally ill. Although increased funding of mental health centers, stricter gun control, increased supervision of the mentally unbalanced, or higher standards for probation officers may be desirable, they are Band-Aid remedies. In the long run, the solution will be found in the knowledge required to produce accurate diagnoses and cures. The research to provide that knowledge will be far cheaper, and the results much fairer, than Draconian law enforcement.—DANIEL E. KOSHLAND, JR.