YOUNG BIOLOGISTS

Europe's Rising Stars, Viewed From America

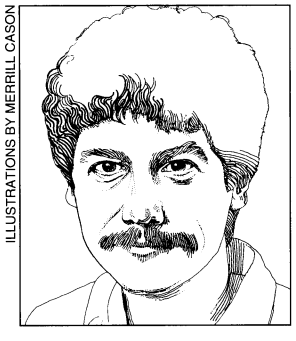
Who are the brightest young biologists in Europe? Everyone would like to know the answer, but there is no infallible method for spotting rising stars—as even Hollywood can attest. So, instead of trying to compile a comprehensive Who's Who *of the best in Europe, we offer below the names of 49 young European scientists who've succeeded in creating a stir in America. Our sources are the 56 U.S. scientists who make up* Science's *Board of Reviewing Editors: To them we put the question, "Which young Europeans do you think are on the way to the top?" The result, drawn from the most frequently mentioned names, is just as revealing about the links between the United States and Europe as it is about Europe's talent: British scientists (56% of the total) are still much better known in America than, for example, are their colleagues from France. (And if you think this survey is too myopic, turn to the reader response survey on page 488.)* Science *sent its reporters to meet 10 people on the list (selected not because they were the elite of an elite but to cover different subjects and countries) to ask them how they got where they are and what they're going to do in the future.*

PATRICK STRAGIER

■

When French molecular biologist Patrick Stragier received the Medal of the European Molecular Biology Organization (EMBO) last September, he just squeaked in: Only scientists 40 years or younger are eligible, and he was 1 month away from his 41st birthday. Stragier is used to such close calls. More than once he has been on the verge of quitting research entirely.

"Sometimes I wondered if I was really cut out to be a scientist," he says. Now, Stragier's work on the role of sigma factors—protein subunits that bind to RNA polymerases and direct them to specific DNA sequences—in the control of sporulation in the soil bacterium *Bacillus subtilis* is internationally recognized. But the first 10 years of his career were "very disappointing," Stragier says.



ILLUSTRATIONS BY MERRILL CASON

He was following a model of how RNA polymerases in *B. subtilis* recognize their promotor that was simply "wrong," he says. None of his work seemed to be worth writing up: "It was publish or perish, and I was about to perish." But thanks to the long-term support possible under the French research system, he backed out of his blind alley, and, after spending a critical month in Richard Losick's laboratory at Harvard University in 1987, he was able to confirm his new ideas—and publish them in *Science*. Today he leads a group of six scientists at the Institut de Biologie Physico-Chimique in Paris and reckons to wind up the *B. subtilis* work in another 2 or 3 years. Then—on to something else.

–Michael Balter

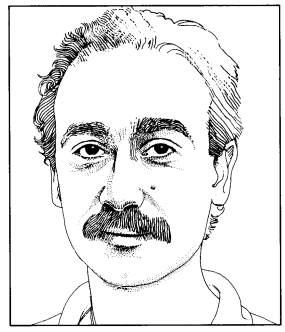
DENIS DUBOULE

■

Asked where he thinks developmental biology is moving, Denis Duboule, 37, laughs and says: "Ça branle du manche"—which means, if you want a literal translation, "a wobbly broomstick." It's also an expression meaning "not firmly fixed," which is definitely how Duboule sees his own future research direction.

The same principle seems to have been at work for a while in Duboule's life. Ten years ago, when he was a graduate student studying embryology at the University of Geneva, Duboule sat through a pair of lectures on a developmental mutation in *Drosophila*. One lecture described the genetics of the mutation and the other covered the cloning of the gene. "I was amazed by the power of the approach," he recalls. "At that time there was no mixing of developmental and molecular biology."

By the following year, Duboule was working as a molecular biologist, with Pierre Chambon at



the Laboratory of Molecular Genetics of Eukaryotes in Strasbourg. His first break came when Chambon suggested they look for mouse homologs of *Drosophila* developmental genes (the homeobox genes). Although several groups were already chasing these genes, they came up with a clever idea of where to look—within a year they had cloned the large homeobox cluster called HOX-1 and Duboule's reputation began to build. Since then he's gone on to show that the genes in mouse HOX clusters determine patterns along the long axes of the body during development.

Some 30 papers later, Duboule leads an eight-person group at the European Molecular Biology Laboratory in Heidelberg. His latest find: two homeobox genes that may determine specific regions in the developing brain.

–Patricia Kahn

MARIA LEPTIN

■

Maria Leptin, 37, spends her days with *single-minded, hunchback, snail, twist*, and a variety of other colorfully named developmental mutants of the fruit fly at the Max Planck Institute for Developmental Biology in Tübingen. The goal of the seven-member group she has led since 1989: to understand the genes that control gastrulation in the fly. An ever-busy person who scribbles reminders to herself on the back of her hand, Leptin has been through a few metamorphoses herself.

She started off as an immunologist, studying for her doctorate at the Basel Institute of Immunology. She had doubts about her career: "I simply thought I wasn't good enough," she says. And she was frustrated by technical difficulties. "At that time [1980]," she says, "the cell culture systems were filthy and the tools just weren't there to do things right." In 1984 she spent a long few weeks in the library reading and thinking. The result: She decided to try switching to developmental biology.

An application to the late Michael Wilcox's lab at the Laboratory for Molecular Biology in Cambridge proved successful, and finally things started to click. Integrins—molecules involved in cell-cell attachment—were a hot new topic and Leptin was in at the beginning, looking at their role in the developing fly embryo. Sev-

eral successful publications followed, and a move to Tübingen 5 years later. What does she think of science now? "It's just the best job I can imagine."

–P.K.

MIKE FERGUSON

■

Mike Ferguson studies the structure, function, and biosynthesis of carbohydrates at Dundee University's biochemistry department. It's an unusual place: Despite its distance from the Oxbridge establishment, in a decade it has built itself a reputation as one of the best biochemistry departments in Britain. The department has head hunted the best—and Ferguson is one of them. At 35, he jointly leads the 14 scientists who make up the Carbohydrate Research Centre. "It's not because I have a burning love of carbohydrates," he explains, but because "most of the important

molecules of protozoan parasites, in terms of their survival and virulence are glycoconjugates [carbohydrates attached to other molecules]." Parasites are his real love.

Ferguson's real love is parasites, and he identified, in *Trypanasoma brucei*, the GPI anchor, an entirely new kind of mooring that secures proteins firmly on the outside of the cell. GPIs enable the parasite to hide beneath a dense blanket of changing surface glycoproteins, which prevent the host's immune defenses from ever identifying the

parasite proper. And GPIs are now turning up in a host of eukaryote cells.

For their study, parasites provide a unique advantage: "Because of their lifestyle, they're natural overexpressors of some things." *T. brucei* has about 10 million GPIs, an ordinary cell 100,000. "I could purify milligrams of the stuff," he says. Along with the basic biochemistry, work on GPI has already spawned two independent lines of research into promising new antiparasite drugs.

–Jeremy Cherfas

OLIVIER KOENIG

■

"My roots are here—the Swiss country, skiing, the Alps, the villages and places where I spent my childhood," says Olivier Koenig, 36. He's talking in his tiny office in Geneva University; the traffic goes by with ordered precision below, and there's still snow on the mountains surrounding the city. But, intellectually, Koenig's roots are across the Atlantic. He's a cognitive neuroscientist—a discipline that combines psychology, neuroanatomy, computer simulation, and theories of information processing—and 3 years ago returned from psychologist Stephen Kosslyn's lab at Harvard. With Geneva still a stronghold of the great Swiss developmental psychologist Jean Piaget's ideas, Koenig is "something of an outsider" in his own country, he admits wryly.

A Swiss Science Foundation grant in 1987 catapulted Koenig from Geneva to Harvard where, he found, "the researcher is king, with all the technical help he needs—libraries, freedom to work at any and all times, easy access to hospital patients, you name it." In 1989, though, he returned to Geneva to teach, head a research group, and become a lonely outpost of cognitive neuroscience.

But his discipline, he says, "is now really taking off in Europe." So should Koenig's reputation. His book *Wet Minds*, written with Kosslyn, is now hitting bookstores.

–John Maurice

GABRIELE GRENNINGLOH

■

Finding a problem seems to be the biggest problem for German molecular biologist Gabriele Grenningloh, 34. "It's almost been too easy," she says with an embarrassed chuckle. "Pure luck, of course."

One piece of luck, perhaps, was being born in the right place—a 30-minute car ride from Heidelberg, home to a leading European university from which she graduated in 1983. And at the right time—the Center for Molecular Biology (ZMBH), where she studied for her Ph.D.,

was established there just after she graduated.

Since then, Grenningloh has given her luck a nudge or two. In 1988, she won a national prize for work (with German neurobiologist Heinrich Betz) on the first cloning of a receptor for the inhibitory neurotransmitter glycine. And a year later, she netted a fellowship, which enabled her to spend 3 years at Corey Goodman's laboratory at the University of California at Berkeley. The lab there turned out to be so international that Grenningloh says she never really noticed being "European." The only things she missed were "family, friends, and good bread." And that's in Berkeley, making her a tough judge of the human staple!

Last January, the smell from the bakery guided Grenningloh back to Europe to a place on an international team at the Glaxo Institute for Molecular Biology in Geneva, Switzerland. The objective: identifying molecules in the brain that could be targets of therapy for Alzheimer's and Parkinson's diseases.

–J.M.

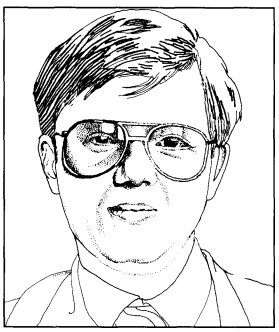
ROBERT LOGIE

■

"There's a lot more slop in physics than most people imagine and a lot less slop in cognitive psychology," says Robert Logie, 38, defending his corner against a charge of physics envy. Logie should know. He started his university career aiming at a physics degree; psychology was a curriculum makeweight. "Fortunately, the Scottish system allowed me to transfer," says Logie, now a lecturer in psychology at the University of Aberdeen in northeast Scotland where he was also an undergraduate.

Logie's speciality is cognitive psychology, an area where he can bring the rigor of physics-style modeling to bear on psychological processes. Recently he has begun to question one of the common assumptions that goes into models of simple tasks, like memorizing a list of words. Models, he says, are based on averages from "normal" people. But work with a physician in Italy showed Logie that brain-damaged patients would often learn to make good a deficit at a specific task. That prompted Logie to go back and look again at so-called normal people—and 40% of them turned out to tackle tasks in ways model model makers hadn't anticipated.

Building on a "common cognitive architecture" people can learn to do tasks in quite different ways, Logie says. That is going to make the job of model building more complicated but it has a



bright side—it will encourage patients with brain damage "to work around their deficit rather than struggling on," says Logie.

–J.C.

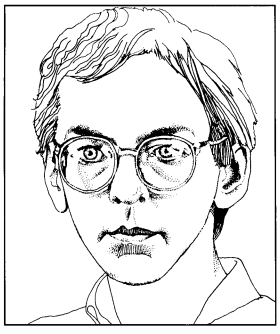
NICK BARTON

■

Colloquial Serbo-Croat is not the kind of title you would expect to find on a population geneticist's shelves, but for Nick Barton it is as vital as the identification handbooks it is sandwiched between. A reader at Edinburgh University, where he develops elegant and acclaimed mathematical models of evolution, Barton, 36, spent last summer tramping around the Yugoslav countryside collecting toads in what is now a war zone.

The toads are the latest animals to assist Barton's attempt to shed light on one of the big questions of biology: How do species arise? A key place to look is a "hybrid zone," where closely related species meet and may interbreed. "By studying hybrid zones you can try to understand how reproductive isolation is evolving," Barton explains.

In the past, Barton has studied animals as diverse as an Alpine grasshopper and, in Central America, Peter's tent-making bat. His publications led to an approach from a Polish scientist relating his work on two species of *Bombina*—the fire-bellied toad—in Eastern Europe and to the start of a joint project. *B. variegata* breeds



in short-lived puddles and develops very rapidly. *B. bombina* prefers proper ponds and grows more slowly. But the two interbreed.

Barton wants to get back to the toads as soon as possible as their survival is at risk. The threat: "Not the fighting, they can survive that—it's modernization." Paved roads will mean fewer wheel ruts filled with muddy water, and thus fewer tadpoles.

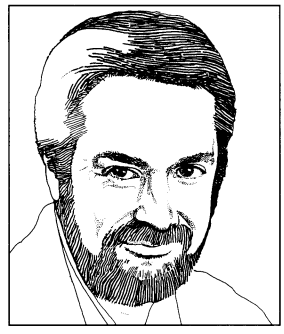
–J.C.

PATRICK BAEUERLE

■

Patrick Baeuerle, now 34, has just published his 50th paper, leads a group of 12 people, and holds one of Germany's few independent research positions for young people, at the Gene Center in Munich. The secret of his success, says Baeuerle, can partly be found in a lesson he learned from Nobel laureate David Baltimore in 1988 while a fellow at the Whitehead Institute at MIT: "Think simply. Do the simplest experiments using the most obvious methods."

Baeuerle was not exactly unprepared for that piece of wisdom, having decided to leave Germany after getting his Ph.D. to experience "a top American lab." His break came at the Whitehead, with publications in *Cell* and *Science* on nuclear factor NF-kB, a protein that stimulates the transcription of "defense" genes when a cell is invaded by viruses or parasites or hit by agents that damage DNA. His key finding was that the release of NF-kB is controlled out in the cytoplasm where an inhibitor polypeptide, IkB, keeps it inactive until needed.



"Proteins do all the work, even in transcription," has become Baeuerle's slogan as he continues to explore how NF-kB works. One intriguing finding: oxygen radicals, released when a cell is stressed, may be the key "second messengers" common to all NF-kB-inducing agents.

–P.K.

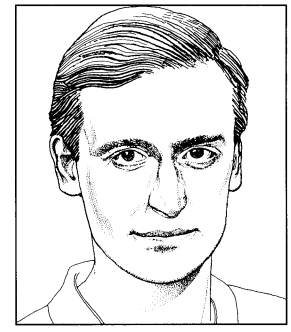
JULIAN DOWNWARD

■

Julian Downward is a quiet young man with a talent for understatement. When he finished his Ph.D. at the Imperial Cancer Research Fund (ICRF) in London in 1986, Downward was just 25 and had already published three papers in *Nature* on the epidermal growth factor receptor. His only comment? "My project went pretty well."

Downward hasn't looked back since then. A 3-year sojourn in Robert Weinberg's laboratory at the Whitehead Institute at MIT saw him switch to the ras proteins that regulate cell growth. Now 31, he's back at ICRF, heading a seven-member group, which in 1990 became the first to show that ras proteins can be activated by stimuli from outside the cell.

Living with early success was not always easy: "It can make things harder if they don't go well afterwards...when I was a postdoc I had very high expectations of what it was reasonable to achieve,"



he says. In any case, Downward doesn't take too much of the credit for himself: He made it early, he says, because of the British system, which puts people through their doctorates fast. Now the British system is working in his favor again: At ICRF, there's little "heavy grant writing" to keep him away from the bench, he says.

Downward shows no signs of slacking. His latest paper, on the regulation of ras in neurofibromatosis patients, appears in this week's *Nature*. And the future? He hopes to unravel the signal transduction pathway that lies downstream of ras.

...and 39 other young* stars whom you'll be hearing of again

MOLECULAR BIOLOGY & GENETICS
Kari Alitalo, University of Helsinki
Giulio Draetta, European Molecular Biology Laboratory, Heidelberg
Peter Goodfellow, Imperial Cancer Research Fund, London
Stephen Green, ICI Central Toxicology Laboratory, Macclesfield
Alan Hall, Institute of Cancer Research, London
Stephen Jackson, Institute of Cancer and Developmental Biology, Cambridge
Alain Jacquier, Pasteur Institute, Paris
Angus Lamond, European Molecular Biology Laboratory, Heidelberg
Kim Nasmyth, Institute of Molecular Pathology, Vienna
Andrew Newman, Laboratory of Molecular Biology, Cambridge
Hugh Pelham, Laboratory of Molecular Biology, Cambridge
Didier Picard, University of Geneva
Greg Winter, MRC Center for Protein Engineering, Cambridge

DEVELOPMENTAL BIOLOGY
Mariann Bienz, Laboratory of Molecular Biology, Cambridge
Enrico Coen, Institute of Plant Science Research, Norwich
Philip Ingham, Imperial Cancer Research Fund, Oxford
Anette Preiss, University of Basel Biozentrum, Basel
Jack Price, National Institute for Medical Research, London
Jim Smith, National Institute for Medical Research, London
Claudia Stuermer, University of Constance

STRUCTURAL BIOLOGY
David Stuart, University of Oxford

CELL BIOLOGY
Morgane Bomsel, Pasteur Institute, Paris
Erich Nigg, Swiss Institute for Experimental Cancer Research, Epilenges
Charles Strueli, University of Manchester

NEUROBIOLOGY
Rodney Douglas and **Kevan Martin**, Anatomical Neuropharmacology Unit, Oxford
Ferdinando Nicoletti, University of Catania, Sicily
Tadeusz Wieloch, University of Lund

IMMUNOLOGY
Søren Buus, University of Copenhagen
Antonio Lanzavecchia, Basel Institute for Immunology
Bernard Malissen, Center for Immunology, Marseilles
Michael Neuberger, Laboratory of Molecular Biology, Cambridge

ECOLOGY & EVOLUTION
Rauno Alatalo, University of Jyväskylä, Finland
Mats Björklund, University of Uppsala
Torbjörn Ebenhard, University of Uppsala
Charles Godfray, Imperial College, Silwood Park
Heikki Henttonen, Finnish Forest Research Institute, Vantaa
Angela McLean, University of Oxford
Martin Nowak, University of Oxford
Mark Rees, Imperial College, Silwood Park

*Opinion of "young" converged at 41 years old or less.