



THE brittle star *Ophiolepis impressa*, a graceful agile relative of the sluggish sea star. Taken from *Sea Stars, Sea Urchins, and Allies* by G. Hendler, J. E. Miller, D. L. Pawson and P. M. Kier, a comprehensive guide to the identification and natural history of the echinoderms of Florida and the Caribbean. Smithsonian Institution Press, \$39.95.

Invisible strangers

June Goodfield

Women Scientists in America: Before Affirmative Action 1940–1972. By Margaret W. Rossiter. Johns Hopkins University Press: 1995. Pp. 584. \$35.95, £30.

TWELVE years ago, the first volume of Margaret Rossiter's marathon opus, *Women Scientists in America*, was published to great praise. It was quickly recognized as a landmark study, and most reviewers, myself included, found their appetites whetted for the next volume, which would take the record from 1940 to — we thought — the present day.

Well, the next volume has now appeared. It takes the story a further 32 years to 1972, and is some four-fifths as long as the previous one. And we are probably going to have to wait at least another 12 years before the story is brought up to the present day, by which time the century will have turned.

As I said in my previous review (*Nature* 302, 761; 1983), Rossiter gave us "sophisticated analysis of a complicated situation encapsulated in this phrase: 'it is the history of an occupational group whose status had risen and fallen over time as the women's role responded to external events and pressures'". I ended by asking: "Beyond the present who can say what new pressures may influence the status of women in science, whether in Europe or in America?" Reading this next volume, one is tempted to answer: "the same old ones!"

The first volume provided a story whose *dramatis personae* contained coura-

geous pioneers as well as obscurantist reactionaries — and men and women were both found in each category. The movement to educate women — whose real objective was the production of more enlightened sons — created "a group of highly motivated, qualified and quite remarkable people". But the result, unfortunately was not a recognized cadre of professional women accepted on a par with their male scientific colleagues but a cadre of highly qualified women who had no place to go except back to where they came from — the women's colleges.

Two important things then happened in relatively quick succession, historically speaking: the Second World War, followed by 32 years recognized as a golden age for science in the United States. And under the influence of Vannevar Bush and the National Science Foundation and the National Institutes of Health, science went on to flourish as it had never flourished before, measured by whatever criteria one might choose, whether money spent, persons trained, jobs created, articles published or Nobel prizes won. Yet, as Rossiter asks in her introduction, if this was so, why were women still invisible?

At the beginning it had seemed all so promising. The Second World War was a complete and tragic disaster for many people in many countries, but it did galvanize the status of women and was probably the then single greatest agent of social change. In the United Kingdom, for instance, women joined the Women's Royal Naval Service or the Auxiliary Territorial Service or the Women's Royal Air Force; they manned anti-aircraft guns; they flew aeroplanes across the Atlantic; they made munitions in factories; they dug

the land and harvested the crops; and they joined — as scientists — Britain's radar research establishment in Malvern. And when the war was over, most did not want to return to the confines of home and family, or to a life of domestic help, serving the aristocracy or the *nouveau riche* of the middle class. They even became strangers to their husbands, as the delectable film *Perfect Strangers*, featuring Deborah Kerr and Robert Donat, beautifully showed.

The war changed social attitudes and behaviour in the United States too. Horsemeat, initially offered on the Friday menu of Harvard University's Faculty Club so that there was one 'non-meat day' a week in the interests of austerity, was rapidly removed when the war ended but quickly reappeared after cries from an outraged faculty. (How unlike the dear common-room life at Oxford and Cambridge!) But, as Rossiter points out in her admirably clear introduction, the war apparently saw the start of a remarkable period for women in science. They were told that they could do anything; they were recruited for certain scientific and technical projects; and the manpower demands of a highly technological military-industrial complex saw officials launch a campaign for 'women power' as they urged bright women to train in the nontraditional areas of science and engineering. As a result, record numbers of women earned doctorates in scientific and technical fields, but they disappeared. Why?

Rossiter sets out a series of questions she then proceeds to answer. Did the specific areas or fields of study in which these women operated happen to grow less slowly than those of men? Did the scientific job market work differently for them? Did marriage or marital status in general have a limiting impact on their careers? And, if the answer to all these questions was yes, why and how did these limits to women's opportunity rise and fall?

Once again, Rossiter displays an intriguing and yet infuriating paradox. In the first volume she showed how all the efforts to educate women took them back into their own colleges. In the second volume she shows that, against all expectations, the period under questions was a Dark Age for women in all the professions, not only science:

The growth and affluence of the period that could have made room for more and better trained scientists of both sexes, did not benefit the two equally; in fact, they generally unleashed certain forces that hastened the women's exit and subsequent marginalisation and under-utilisation, which could then be cited to justify denying further training for their successors.

Perhaps most tragically of all — and this could even be considered a form of

betrayal — women's colleges, far from being the benefactors to their kind, threw up the greatest obstacles. Rossiter presents convincing evidence that:

Most of the women's traditional employers, such as women's colleges, teacher colleges, and colleges of home economics, were closing their doors... and they [women] were not included on the faculties of the growing and new co-educational institutions. Much of this new exclusion was tied to marriage, as in the reinstatement of the ante-nepotism rules on most campuses after World War II. But even single women were ousted or just not hired in the pronatalist years, often for fear that they might later get married.... Thus the pattern was deliberate and grew widespread.

Matters were to change of course, but it took at least 20 years before even a wedge was insinuated into the closed door — although 'drawbridge' and 'portcullis' might be better metaphors. For not only did men return from the war and re-establish themselves in the hierarchy of the professions, with the naturally accepted attitudes of dominance, but recruitment in universities and liberal arts colleges, previously female-dominated areas, now became masculinized. Perhaps most chilling is the way in which this change was more than tacitly endorsed by foundation officials and academic administrators. So in a time that gave a young male scientist every opportunity and enhanced status, young women were "supposed to be at home with the children, whether they had them or not, or whether they wanted to be there or not".

Discrimination was a word that did not come into use until the late 1960s. Before then the social patterns were seen as just the way things were, always had been and should always remain. So those professional women who clearly understood what was happening, who did see a pattern and reported it, were understandably reluctant to criticize the powerful and successful. Even those who actually tried to do something, to correct the situation, were more often than not ineffectual. Some were ineffectual because of the strength of the opposition: Margaret Mitchell's article in 1951 on these matters was shot out of the sky by a counterblast from a Harvard psychologist of such force and venom that the topic was never raised again for a decade. Sometimes they were ineffectual through their own muddled thinking and passion for compromise, as when a committee of Harvard Faculty and Radcliffe Trustees wrote a report on the limits of women's opportunities in the academic world that was so bland and compromising it was totally counterproductive. Yet such was the prevailing mindset, and social ambience, that, as Rossiter claims, if the data *had* been interpreted to demonstrate discrimination, they would

probably not have been published; if they had been published, more likely than not they would have been ignored.

When the change came, it came not from within science but from the activities of many social scientists set against a larger social reality. And there was now one new element within this larger reality that had nothing to do with the science.

The civil rights movement proved to be the agent. Rossiter argues that Alice Rossi, who devoted many years in the early 1960s to rethinking and reformulating prevailing wisdom, was able to come up with a new view only because, in the context of the civil rights movement, she could really *see* a pattern. True, others had too, but she could delineate the complex of oppressive attitudes and practices. Women in science did not deserve their fate and should not be blamed for their obscurity, in the same way that blacks did not deserve *their* fate and could not be blamed for it, either. Society could and should be changed; laws would have to be passed by Congress, however reluctant, and finally the executive branch would have to be pressured into enforcing the laws. By 1969, the anger of women had coalesced into a movement; innumerable reports on the status of women followed, angering even more women as the totality of their exclusion was documented further and brought fully into view. By 1970, federal hearings on sex discrimination on the campus and workforce were being held; by 1972, landmark legislation was in place on equal pay and affirmative action in

academic institutions.

This then is the general thesis for which the 16 chapters in this book provide irrefutable evidence, assembled with the careful scholarship that has become Rossiter's hallmark. Once again, the quantity of material researched is enormous, and my caveats are few. So much is involved in these 20 years, so much to be covered, that I found the book heavier going than its predecessor, with fewer of the light touches of irony and humour that I had enjoyed so much before. Rossiter declares in her final sentence that these 32 years marked "the ending of an era and the beginning of a new and more equitable one". Yet those who rejoice and applaud what has happened should always reflect that, as George Steiner once wrote about science, there will always be moral ambushes waiting for us. Nothing will be clear-cut and simple. Reading social history, whether George Trevelyan's, Asa Briggs' or Margaret Rossiter's, I am pulled back time and again to what William Blake wrote in *The Vision of John Bull*: "I ponder on how men fight and lose the battle and the thing they fought for comes about in spite of their defeat. And when it comes turns out to be not what they meant and other people have to fight for what they meant under another name." □

June Goodfield, emeritus professor at George Mason University, Fairfax, Virginia, is at International Health and Biomedicine, The Manor House, Alfriston, East Sussex BN26 5SY, UK.

Sceptical wonderment

Alan Cromer

The Demon-Haunted World: Science as a Candle in the Dark. By Carl Sagan. *Random/Headline: 1996. Pp. 436. \$25.95, £18.99.*

CARL Sagan's high "wonder quotient" was tempered at an early age by the scepticism of Martin Gardner's *Fads and Fallacies in the Name of Science*. And wonder and scepticism have been "uneasily cohabiting" modes of thought throughout Sagan's career. Both he and Gardner have long been affiliated with the Committee for the Scientific Investigation of Claims of the Paranormal, publisher of the *Skeptical Inquirer (SI)*, and Sagan writes as a committed, indeed, a crusading, sceptic about many of the incredible beliefs familiar to *SI* readers. There is much fun to be had in reading about the debunking of such 'mysteries' as the English crop circles (produced by a pair of dedicated pranksters) and the crash in Roswell, New Mexico, of an alien spacecraft (a secret high-altitude

military balloon).

Sagan writes regularly for *Parade*, a Sunday newspaper magazine that reaches a staggering 37 million US households (83 million readers). Seven chapters in this book are an expansion of a 1993 *Parade* article on why he does not believe in alien abductions. Other chapters were written on different occasions for different audiences, making for much repetition and confusion of purpose. Some are clearly for students in his Cornell University course on critical thinking, some are based on articles in *Parade*, some are for scientists, and the final chapter is based on an address given at an induction ceremony for new US citizens.

Sagan is a forceful advocate for science and a fierce opponent of pseudoscience, mysticism and religion. "Science", he writes, "is different from any other human enterprise... in its passion for framing testable hypotheses, in its search for definite experiments that confirm or deny ideas, and in the vigour of its sub-