

OBITUARY

Clifford Ambrose Truesdell (1919–2000)

Clifford Ambrose Truesdell died on 14 January 2000 in Baltimore shortly before his 81st birthday. He was born in Los Angeles on 18 February 1919. He is survived by his wife of 48 years, Charlotte Brudno, his son Clifford, by his first wife, and two grandsons. He was Emeritus Professor of Rational Mechanics at Johns Hopkins University.

After graduating from Los Angeles' Polytechnic High School he spent two years in Europe, became fluent in German, French and Italian, improved his knowledge of Latin and Greek and began his lifelong romance with baroque literature, art and music. Perhaps he dreamed of becoming a poet. Instead he turned to science and, as a eulogy put it, 'poetry's loss proved to be a godsend for rational mechanics'. He achieved his B.S. (in mathematics and physics) and his M.S. (in mathematics) at the California Institute of Technology, a Certificate in Mathematics at Brown, his Ph.D. in Mathematics at Princeton; concurrently he worked as an assistant and instructor. He then joined the staff of the Radiation Laboratory at M.I.T. for just over a year, later to be given, in succession, the responsibility of the theoretical mechanics subdivision at the Naval Ordnance Laboratory and that of the theoretical mechanics section of the Naval Research Laboratory.

Aged just over 30 he became professor of mathematics at Indiana and, finally in 1961, was offered a chair at Johns Hopkins, a chair which he asked to be titled 'of Rational Mechanics' being appreciative of the rigorous approach to mechanics of the Italian school and finding appropriate that title used by professors in Italy. He taught and cared for successive generations of students and scholars little short of 40 years, not only in Baltimore and, more widely, in the U.S. but also around the world, mainly in Europe but indeed in Brazil, China, Israel, Mexico and Australia. He visited Italy almost every year, chaired several Italian–American meetings, provided support for visits to the USA of great many young Italian researchers.

He realized, already in his earlier appointments, how shaky (he would say 'irrational') the foundations of more recent developments in mechanics were and how important it would be, even for wide use, to put that chapter of science in order. It appeared urgent to link new advances, firmly, with paramount essays of Euler, the Bernoullis, Lagrange, Cauchy and other great savants of earlier centuries rather than, precariously, with dubious accounts of mediocre followers. He then set forth to provide those links himself and, with almost missionary zeal, encouraged others to contribute in the endeavour. He went back to classic treatises, hardly read by anyone anymore, so as to interpret them a new and expound their main results in a modern idiom, evidencing at once their essential role at time of discovery and their enduring eminent value. The latter task he accomplished with efficacy and brilliance in a rich, sometimes old-fashioned, but always perfectly befitting English. He admitted Latin as an acceptable language for scientific communications to his journals; he wrote some papers himself in Latin.

Thus began also his pledge to the history of science not as a professional, rather as an engaged amateur (an idiot, as he wrote in a title), a scientist by profession. The results were

amazing in depth and breadth – witness the immense Introductions to volumes X to XIII of the second series of Euler's Opera Omnia.

He did not narrow his readings to the essays of the famous but explored libraries and archives for minor or almost forgotten contributions. Duly quoting the latter, he felt moved either to add his sharp, well-informed, frequently witty, comment or criticism or, at times, to declare that he was refreshing a lost gem (as was the case for papers by Herapath, Waterstone and Reech); he brought to light again the contributions of Piola, long unread even in Italy and attributed to him due priority in important definitions and theorems.

In collaboration with Richard Toupin he collected, corrected or clarified, criticized or gave new luster, completed, expanded on all contributions to 'The Classical Theory of Fields' of the last three centuries in a volume of the Encyclopedia of Physics, which became an essential tool for all researchers in Continuum Mechanics. That volume appeared in 1960, when he was already planning a second volume of the Encyclopedia on 'The Non-linear Field Theories of Mechanics' which would offer the basis for all new developments imagined at the time, also updating the earlier treatise with the exciting discoveries of the 50s. He involved Walter Noll in this second enterprise; the sharp, rigorous approach of the co-author together with the vast knowledge and elegant prose of the principal led to a magnificent presentation where geometry of deformations, kinetics of evolutions, balance of interactions, constitutive properties of simple or more complex bodies each found separate consequential attention, forming together a well-structured springboard for the expansion of Continuum Mechanics in the last three decades of the century. This second volume appeared in 1965.

Clifford Truesdell was always worried about obstacles that well-ingrained, scenscent 'authorities' could put in the way so as to stop the flood of new ideas ('there are clouds in the sky of natural philosophy; they are not heavenly portents, they are raised by hoofs'). He realized the need for a new scientific journal, severe in selection but otherwise completely open-minded: already in Indiana he was the co-founder and co-editor of the Journal of Rational Mechanics and Analysis (1952–1956). Later he abandoned that enterprise to found, alone, a new journal (since 1957), where his ideals of perfection (even in typesetting) could be pursued; the Archive for Rational Mechanics and Analysis became the hallmark in the field and young scholars sought publication of their best work there as the sign of their entry into an exclusive club of perfectionists. Perhaps one limitation could be regretted: analysis is not the only chapter of mathematics relevant for mechanics, whereas the title of the Archive seems to give it a supreme position. Now some scientists seem to attribute such supremacy and exclusivity to the calculus of variations.

Some of Truesdell's rules of behaviour in the study of the history of science were also far from stale standards and again he planned to offer a forum for his like-minded colleagues. The Archive for the History of Exact Sciences appeared first in 1960 imposing the highest quality in content and form for contributions. When the Italian Mathematical Union decided to launch a new journal on the history of mathematics, he accepted to serve on the editorial board and kept that appointment to the end.

Clifford Truesdell was editor of other volumes of the Encyclopedia of Physics, was responsible for two Springer collections (the Reihe fuer Mechanik within the Ergebnisse and the Tracts in Natural Philosophy) and was a member of many Editorial Boards.

Three chapters of natural philosophy seemed to Truesdell to be in a particularly sorry state and in need of an overhaul: the theory of mixtures, thermodynamics and the kinetic theory of gases in so far the latter could offer the ground for continuum gas dynamics. Again he set about collecting the strands from the earlier contributions of the greats, cleaning up the rather

confused recent exegesis and building a springboard for the future. Here the obstacles to a satisfactory conclusion were much greater. Perhaps we are even missing as yet the appropriate mathematical tools. However, he delimited clearly a secure stand, gave some ground-breaking theorems, opened the road for many important, if not yet definitive, contributions. He found occasion to exert his acid wit in his comments to the *Tragicomical History of Thermodynamics* (1980), he revived the rigorous foundation that Reech gave for Carnot's theory of heat engines (1977), tried his hand in proposing a Rational Thermodynamics calling to his help many colleagues for a second, larger edition (1984), although more perspectives were thus opened than problems closed. He tried to capture in that book and other essays the elusive *jinnee* named entropy, with mixed success. He gave an account of Maxwell's Kinetic Theory, delimiting sharply (of a Single Monoatomic Gas) what could be dealt with precisely (Treated as a Branch of Rational Mechanics) and provided hints towards extended thermodynamics. He first announced his proposals for a rational theory of mixtures in Italian in the proceedings of the Archimedean Symposium.

He was a co-founder of the Society for Natural Philosophy and was repeatedly officer of the society, helping to organize many of their meetings. He drew the rules which would govern the Society, taking care that older scientists would never wield prevailing influence in it.

Many honours were profused on Clifford Truesdell. He was awarded honorary doctorates (by the Milan Polytechnic (1965), the Universities of Tulane (1976), Uppsala (1979), Basel (1979) and Ferrara (1992)) and many prizes (among many: twice the Euler medal of the U.S.S.R. Academy of Sciences (1958, 1983), the Bingham medal (1963), the Panetti medal (1967), the Birkhoff prize (1978), the Ordine del Cherubino (1978)). He was elected member of many Academies, in fact of all main Academies in Italy (Modena (1960), Istituto Lombardo (1968), Istituto Veneto (1969), Bologna (1971), Lincei (1972), Torino (1978), d'Histoire des Sciences (Paris, 1961), de Philosophie des Sciences (Bruxelles, 1974)).

It is impossible, in a short obituary, to describe satisfactorily the personal gifts of Clifford Truesdell. However, one must at least recall his unbounded generosity towards all in need of academic help; his lavish hospitality at the Palazzetto (here with the essential help of Mrs Charlotte Truesdell), his unstinting support in making one's writing correct and appropriate, his beneficial severity in judging bungled essays (again here the assiduous editorial assistance of Mrs Truesdell must be mentioned).

To the motto *STRUIMUS* over the entrance of the Palazzetto, Clifford Truesdell set against, in his study over the bookshelves, a skeleton with the motto *QUOD STRUIT RUO*. It is our pledge to deny death that wish and make sure that over the legacy of Clifford Truesdell *MORS NON PREVALEBIT*. This pledge should be especially stringent for Italian researchers in mechanics; so many of them have profited of the help and experienced the generosity of Clifford Truesdell. The pledge will have a testimonial in some rooms of the Collegio Puteano of the Scuola Normale Superiore in Pisa, where Clifford Truesdell's scientific library, graciously donated by Mrs Truesdell, will finally be housed.

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