

A biography and obituary of Svein B. Manum (1926–2015)

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(insert the two photographs of Svein Manum supplied here side-by side. The monochrome image should be placed on the left, and its caption should read: “Svein Manum working at the microscope at the University of Oslo in 1952 when he was undertaking his *Candidatus realium* research. Photographer unknown.” The colour photograph should be placed on the right, and its caption should read: “Svein Manum at the microscope in December 2014. The image was taken by Ronny Setsaa, and is used with permission.”)

1. Introduction

Professor Emeritus Svein B. Manum was a true pioneer in both national Norwegian and international palaeobotany and palynology. Specifically, he singlehandedly instigated pre-Quaternary palynology in Norway. He sadly passed away on September 30th 2015 when he was nearly 89 years old. Svein had a long career as a researcher in, and a teacher of, palaeobotany and palynology. This article on Svein Manum’s life and career is based on the collective memories of the authors, correspondence and unpublished notes by Svein (see also Mangerud 2015; Vigran 2016).

2. Childhood, education and family life

Svein Bendik Manum was born on October 3rd 1926 to Ivar Rui Manum and Anna Walborg. He grew up in the town of Askim, in Østfold, southeast Norway, where his parents ran a grocery shop. Svein graduated from Askim Senior High School in 1945 then became an

30 undergraduate at the University of Oslo in 1946, shortly after the end of World War II. He
31 was one of those students who were the first from their families to attend university. Svein
32 had an advantage over many of his contemporaries because he was able to attend a senior
33 high school in Askim, which prepared him well for applying for higher education. At this
34 time, Norway was recovering from five years of German occupation which had severely
35 affected science in the country. He completed his bachelor's degree in botany, mathematics
36 and physics in 1950, and aspired to become a secondary school teacher despite the very
37 limited funding for postgraduate study during the post-war period. Svein married Randi
38 Hafting in 1953, and they had three children together; these are Ivar, Ketil and Kari, who were
39 born in 1958, 1962 and 1966 respectively.

40

41 **3. Ove Arbo Høeg and the early development of palynology in Norway**

42 In order to get a perspective on the scientific career of Svein Manum, it is essential to
43 understand how palynology first developed in Norway. The earliest pre-Quaternary
44 palynology in Norway was undertaken by the eminent botanist and palaeobotanist Ove
45 Fredrik Arbo Høeg (1898–1993) at the University of Oslo during the 1920s. Høeg worked on
46 modern Norwegian lichens for his **master's** in the early 1920s. During his master's, Arbo
47 Høeg attended lectures on the work of William H. Lang and Robert Kidston on the fossil
48 plants from the Lower Devonian Rhynie Chert of Scotland (Kidston & Lang 1917). His
49 mentor was Professor Th. Kierulf, who also introduced Høeg to the Lower Devonian
50 macrofloras of Spitsbergen. Consequently, Høeg became deeply interested in the anatomy and
51 taxonomy of these early land plants, and undertook pilot studies on their spores as part of his
52 PhD. While Høeg was a research assistant at the Botanical Museum in Oslo between 1924
53 and 1926, he was contacted by state geologist Gunnar Holmsen, who was a Quaternary
54 specialist. Holmsen had attended the 16th Scandinavian Meeting of Natural Scientists in Oslo
55 in 1916 when the Swedish geologist and naturalist Lennart von Post presented his pioneering
56 analysis of pollen in Quaternary peat deposits (von Post 1916; Manten 1967). As a direct
57 consequence, Holmsen asked Arbo Høeg to undertake Quaternary pollen analyses in Oslo.
58 Høeg's interest in early land plants, and the relatively new discipline of Quaternary pollen
59 analysis, made him a confirmed palaeobotanist/palynologist, and consequently he did not
60 pursue lichnology following his **master's**. He moved to Trondheim in 1926 as the leader and
61 curator of the Botany Department at the Videnskapsselskapets Museum. Høeg was also a

62 lecturer at the Norwegian Teacher Training College. Over his career, Høeg worked on various
63 areas of pharmaceutical botany, but his main research was on fossil plants from the Lower
64 Devonian plants of Spitsbergen (Høeg 1937; 1942). Arbo Høeg left Trondheim in 1947 to
65 become Professor of Botany in the Department of Pharmacy at the University of Oslo, where
66 botany was still an important part of the study of pharmacy. In 1947, a national centre for
67 Quaternary palynology was established in Bergen by Knut Fægri (Hafsten 1989; Birks 2002)
68 and, by the 1950s, Norway had a very active research community working on Quaternary
69 pollen.

70

71 **4. Svein Manum the postgraduate student**

72 At secondary school, Svein became fascinated by the modern floras of the Svalbard
73 archipelago (Resvoll-Holmsen 1927) and therefore anticipated that the fossil floras from this
74 region would be equally interesting. During the final year of his bachelor's degree, he became
75 aware of the work of Arbo Høeg at the University of Oslo on the palaeobotany of Western
76 Norway and Spitsbergen. Consequently, after he obtained his bachelor's in 1950, Svein
77 approached Høeg to ask if he would be his supervisor on a *Candidatus realium* postgraduate
78 research programme (broadly equivalent to a master's) on the fossil plants of the high Arctic.
79 Høeg agreed to this having noted Svein's clear enthusiasm and perceptively suggested a novel
80 topic, the palynology of Paleogene coals from Spitsbergen. The pollen and spores of coeval
81 deposits were well known further south in Europe, but had not been studied in Svalbard or
82 elsewhere in the northern high latitudes. As previously mentioned, Høeg had not done much
83 palynology, except notably the extraction of spores from the fertile structures in two
84 Devonian plant species from Spitsbergen. Høeg arranged for Svein to participate in a field
85 excursion for mapping coal seams in Spitsbergen led by Harald Major, a coal geologist with
86 the Norwegian Polar Institute, to collect material for his dissertation. The field party made the
87 journey to Spitsbergen on a coal transport ship. Svein visited Adventdalen and Reindalen
88 during the summer of 1950, which was the warmest year in decades.

89 The field trip in 1950 was the first of several expeditions to Svalbard by Svein. At this
90 time rowing boats were used for local transport, and there was much heavy carrying. Svein
91 loved this fieldwork and made several films. Footage taken by him in Spitsbergen during
92 1964, is available at <http://www.mn.uio.no/geo/tjenester/kunnskap/film-manum/index.html>.
93 On his return from Spitsbergen, Svein learned how to extract and prepare palynomorphs in the

94 laboratory. Arbo Høeg's facilities in the Department of Pharmacy were rather rudimentary.
95 There was a fume cupboard and a sink at opposite ends of a long kitchen worktop, and a
96 hand-powered centrifuge without a cover. Given the chemicals used, the use of this centrifuge
97 was therefore rather dangerous. Svein prepared around 200 coal samples from three of the
98 major Paleogene coal seams on Spitsbergen in this laboratory. The bituminous coals are of
99 high rank, and consequently require aggressive oxidation treatment with Schultze's solution
100 for around one full day to make the palynomorphs transparent and light enough for study
101 (Manum 1956). Svein had been a keen photographer since his teenage years, and had images
102 of Norway's liberation following World War II published. He made use of Høeg's well-
103 equipped darkroom, and purchased a used Exacta camera with his own funds in 1950. At this
104 time, the Exacta was the most advanced single-lens reflex 35 mm camera on the market.
105 Svein used extension tubes to attach his camera to the microscope, and he used this
106 configuration until 1964. He relied on trial and error regarding exposure times until 1960,
107 when he acquired a photometer.

108 Arbo Høeg had an excellent reprint library which included all significant publications
109 since the early 1930s on the palynology of the Carboniferous coals of Europe and the USA,
110 and the Paleogene/Neogene lignites of Germany. These articles were invaluable to Svein as
111 he learned about topics such as nomenclature and taxonomy. He also used Erdtman (1943)
112 and Fægri & Iversen (1950) to research the modern equivalents of his Paleogene pollen
113 grains. One of us (GM) now owns Svein's copy of Erdtman (1943), which was given to him
114 during a visit to Gunnar Erdtman in Stockholm during 1954.

115 Høeg sent Svein to visit Knut Fægri in Bergen during 1951 for training in
116 palynological preparation techniques, because the highly bituminous coals from Spitsbergen
117 were rather difficult to process. Despite his best efforts, trying acetolysis, bleaching and
118 staining, Knut Fægri could not improve upon Svein's procedure. This gave Svein much
119 confidence that his processing techniques were close to optimal. In the spring of 1952, Høeg
120 arranged for Svein to visit Robert Potonié, the head of palaeobotany at the Geological Survey
121 of Nordrhein-Westfalen in Krefeld, Germany. This visit was organised and funded because
122 Høeg had to travel to Lucknow in India, for around one year, on a UNESCO-sponsored
123 mission to become the director of the Birbal Sahni Institute of Palaeobotany after the sudden
124 death of its founder and leader in 1949 (Thomas 1950). Arbo Høeg felt great remorse about
125 leaving his research student, but believed that Svein could learn much from Potonié because

126 of his work on the palynology of Paleogene/Neogene lignites in the 1930s. However, at that
127 time, Potonié was significantly preoccupied working on several of his major papers (e.g.
128 Potonié & Kremp 1954; 1955; 1956; Potonié 1956; 1960), and undertook little or no practical
129 palynology (i.e. laboratory and microscope work). Svein found Robert Potonié to be a rather
130 aloof, distant and elusive figure who would loudly discuss taxonomic philosophy with
131 Gerhard O.W. Kremp for hours on end behind closed doors in his office. However, at Krefeld,
132 Svein met German researchers like Hilde Grebe, Gerhard O.W. Kremp and Paul W.
133 Thomson, and overseas visitors such as Clair A. Brown and Wilhelm Klaus from the USA
134 and Austria respectively. Paul W. Thomson helped Svein immensely with his *Candidatus*
135 *realium* research on the pollen of the Spitsbergen coals. Furthermore, Svein was also
136 extremely grateful to Hilde Grebe and Wilhelm Klaus for advice on laboratory processing and
137 slide production. Klaus, who was an established expert on the palynology of coal (e.g. Klaus
138 1954), was extremely enthused by Svein's research in Spitsbergen. He actively encouraged
139 Svein to publish his results soon because of the unique nature of the data, and even provided
140 Svein with a draft plan.

141 Back at Oslo, Svein and his student contemporaries benefitted enormously from attending
142 Arbo Høeg's lunch meetings in his office. At these occasions, the students met visiting
143 scientists from all over the world such as Harland P. Banks (USA), Mahendra N. Bose (India),
144 Isabel C. Cookson (Australia), Knut Fægri (Norway) and Brita Lundblad (Sweden). Vigran
145 (2016) described Høeg as 'a second father' to his students, and he and Svein remained
146 lifelong friends and colleagues (Manum 1988). Svein finished his *Candidatus realium*
147 dissertation in 1953. This was the first postgraduate project of any kind on pre-Quaternary
148 palynology in Norway, and it was his first publication (Manum 1954). Svein's dissertation in
149 1953 represents the inception of the discipline of pre-Quaternary palynology in Norway.

150 After obtaining his *Candidatus realium* degree in 1953, Svein felt that the dissertation had
151 some loose ends. He approached Arbo Høeg, who had only just returned from Lucknow, to
152 ask if his work could be continued, even as a short term project. As a consequence, Svein
153 obtained funding from the Norwegian Research Council for a research assistantship starting in
154 January 1954. He expanded the sample base to other high latitude localities with
155 Paleogene/Neogene coals such as Alaska, Arctic Canada (Ellesmere Island), Greenland and
156 Iceland. As part of this work Svein visited the pioneer of Swedish palynology, Gunnar
157 Erdtman, in Bromma, western Stockholm later that year. Erdtman was a pioneer of plant

158 taxonomy and pollen morphology (Nilsson & Praglowski 1978). Svein compared his
159 Spitsbergen Paleogene material with Erdtman's extensive collection of modern pollen, and
160 was instructed in microscopical techniques. Erdtman taught Svein how to produce *camera*
161 *lucida* drawings of pollen exines. He also enthusiastically encouraged Svein to continue his
162 research in order to obtain a PhD on the palynology of the Paleogene coals of the northern
163 high latitudes.

164 Research and teaching in geology and palaeontology at the University of Oslo took
165 place in different buildings until 1958. This was not an ideal situation, and plans were made
166 for a single earth science building in the early 1950s. Arbo Høeg had successfully argued for a
167 palaeobotany section for the new building, which was inaugurated in the autumn of 1958.
168 From his position in the Department of Pharmacy, Høeg began teaching palaeobotany in
169 1960, which was the first time this discipline had been formally taught in Norway. Svein
170 moved to new facilities in the new building, where he was joined by Jorunn Os Vigran, who
171 had started her research on the palynology of the Høeg's extensive collection of Devonian
172 plant-bearing sandstones.

173 On November 24th 1962, Svein defended his PhD thesis (Manum 1962); the opponents
174 were Knut Fægri of the University of Bergen and the Swedish palynologist Brita Lundblad.
175 Fægri was the pioneer of Quaternary pollen analysis in Norway (Birks 2002). Knut Fægri was
176 very enthusiastic about Svein's work, and commented that he had never seen such beautiful
177 photographic plates produced by a postgraduate student. After the **successful** thesis defence,
178 Svein became an associate professor in palaeobotany at the University of Oslo and took over
179 Høeg's course in late 1962.

180

181 **5. The career scientific**

182 Svein Manum's appointment as a faculty member at the University of Oslo in 1962 was
183 indeed a watershed moment for him. As a schoolboy, undergraduate and *Candidatus realium*
184 student, he thought that life as a university academic was beyond him. He worked for the
185 University of Oslo for all his 33-year professional career, and was promoted to professor in
186 1982.

187 An overseas visitor to Oslo had a profound influence on Svein's career. In 1959 and
188 1963, the eminent Australian palaeobotanist and palynologist Isabel C. Cookson visited the

189 university (Riding & Dettmann 2013, p. 119–121). She had been invited to Norway in 1959
190 by Arbo Høeg to discuss early land plants, and to lecture on palaeobotany and palynology to
191 his students. However, Cookson had not been particularly active in palaeobotany for some
192 years, and now concentrated virtually exclusively on palynology. Like most palynologists at
193 this time, she had begun by studying terrestrial palynomorphs but, in the early 1950s, had
194 turned her attention to marine palynology (Cookson 1953; Riding & Dettmann 2013). Isabel
195 preferred to discuss palynology with Svein, rather than talk about early land plants with Arbo
196 Høeg. She agreed to process several Arctic Paleogene samples which had just arrived in Oslo.
197 Cookson found a new dinoflagellate cyst palynoflora in this material, and one of these forms
198 was named for her as *Svalbardella cooksoniae* Manum 1960. These assemblages with their
199 abundant and well-preserved dinoflagellate cysts immediately fascinated Svein, and Isabel
200 Cookson mentored him closely in aquatic palynomorphs. Hence, Cookson inspired in Svein a
201 lifelong interest in marine palynology (Mangerud 2015). Isabel and Svein collaborated a great
202 deal, and Cookson's first visit to Oslo resulted in Manum (1960a; 1960b) and Cookson &
203 Manum (1960). The second visit by Cookson to Oslo in 1963 also resulted in several papers
204 including Manum (1963a) and Manum & Cookson (1964). However, their most significant
205 collaboration was a joint study on Upper Cretaceous dinoflagellate cysts from Graham Island
206 and Ellef Ringnes Island in the Canadian Arctic (Cookson & Manum 1964).

207 After one year (1965–1966) working with Professor Tom M. Harris on Arctic
208 palaeobotany at the University of Reading on a NATO Science Fellowship, Svein, Randi and
209 their three children travelled to Uganda. This visit was sponsored by the Norwegian Agency
210 for Development Cooperation (NORAD), and Svein became Professor and Head of the
211 Department of Botany at Makerere University in Kampala between 1967 and 1970. The
212 undergraduate students in Kampala were taught about the highly diverse East African flora.
213 Svein demonstrated his agility and flexibility by combining being Head of Department, and
214 teaching modern tropical botany. The Manum family was able to travel extensively within
215 Uganda, and they all enjoyed living in East Africa very much.

216 The Manum family returned to Norway in 1970. This was soon after the Ekofisk
217 oilfield had been discovered by the Phillips Petroleum Company in the Norwegian sector of the
218 North Sea during 1969. Svein's expertise in dinoflagellate cysts was suddenly in great
219 demand. At this time, Svein joined a group of experts to establish laboratories to investigate
220 the subsea geology of the North Sea and the Norwegian Shelf. So, from 1971, the Norwegian

221 Research Council for Science (NTNF) supported several laboratories which had close
222 contacts with the University of Oslo. Jorunn Os Vigran was employed as a palynologist in
223 Trondheim from 1972, and Bindra Thusu was appointed in 1973 to establish a new
224 palynology laboratory in Oslo. The laboratories and offices in Oslo were moved to Trondheim
225 in 1975 to become part of the Continental Shelf Institute (IKU), which today is SINTEF
226 Petroleum. From the 1970s onwards, Svein supervised postgraduate students in projects
227 which were related to petroleum geology and on the Norwegian Arctic. The first of these was
228 Tor Bjærke, who graduated in 1975 with a study of the palynology of the Upper Triassic of
229 the Arctic (Bjærke & Manum 1977). Another student, Torbjørn Throndsen, worked on the
230 Paleogene dinoflagellate cysts of Spitsbergen (Manum & Throndsen 1986). Despite the
231 enduring focus on the petroleum geology of the North Sea, Svein maintained a broad
232 perspective in palynology both geographically and across the spectrum of palynomorph
233 groups (e.g. Manum 1967; Balduzzi et al. 1993).

234 During the 1970s, Svein and colleagues undertook work on Deep Sea Drilling Project
235 (DSDP, now the International Ocean Discovery Program) material from DSDP Leg 38 in the
236 Norwegian Sea. They analysed ~1000 samples from Leg 38, and this material was the basis
237 for the first Paleogene/Neogene (Eocene–Miocene) palynomorph zonation for offshore
238 Norway (Manum et al. 1989). Svein later described this paper as his greatest scientific
239 achievement. Also during the 1970s, Svein undertook highly significant collaborations such
240 as with Bill Evitt of Stanford University, California and Graham Williams of the Geological
241 Survey of Canada. In late 1976, he spent a sabbatical of several months with Bill Evitt at
242 Stanford. Evitt had visited Oslo in July and August 1976 to present one of his famous
243 *Teaching Conferences on Fossil Dinoflagellates* (Riding & Lucas Clark 2016, p. 73). At that
244 time Evitt was developing his new ideas on the tabulation of dinoflagellates (Evitt 1985), thus
245 Svein would have provided substantial input on this topic in the seminars that Bill gave at
246 Stanford. Later Svein named a new dinoflagellate cyst genus, *Evittosphaerula*, to honour Bill
247 Evitt (Manum 1979). During Svein's sojourn in California, he received training in vitrinite
248 reflectance from Neely H. Bostick, one of Bill Evitt's former research students.

249 Svein collaborated with colleagues at the Italian oil company AGIP (now ENI) during
250 the 1980s. This strong alliance resulted in annual field trips to Italy and the Mediterranean
251 region for students at the University of Oslo, and it led to publications on Italian material such
252 as Biffi & Manum (1988). At this time, Svein continued working on material from the

253 Greenland-Norwegian Sea and the Norwegian Sea (e.g. Boulter & Manum 1989; 1996;
254 Manum et al. 1989; Hubbard et al. 1994; Poulsen et al. 1996; Williams & Manum 1999).
255 Therefore Svein Manum was a major contributor on the Paleogene/Neogene dinoflagellate
256 biostratigraphy of the high northern latitudes.

257 Palaeobotany was an enduring interest of Svein's throughout his career, with particular
258 emphasis on Arctic palaeofloras and their palaeoecology (e.g. Manum 1960b; 1963b; 1966a;
259 1968; 1987; 1994; Manum et al. 1991a; 2000). The Indian palaeobotanist from Lucknow,
260 Mahendra Bose, and Svein travelled to Spitsbergen to sample Cretaceous and Paleogene
261 macrofossils in 1990 (Bose & Manum 1990; 1991). Svein also continued research begun by
262 his mentor, Arbo Høeg, on Arctic material collected by the early Swedish explorers such as
263 Alfred G. Nathorst and Thore G. Halle which is housed in the Swedish Museum of Natural
264 History in Stockholm (Manum 1984; Kvaček & Manum 1993; 1997; Kvaček et al. 1994;
265 Denk et al. 1999).

266 Svein found enigmatic, organic, net-like objects in coals from the Triassic onwards
267 which intrigued him greatly. These were originally described by Harris and Rest (1966), who
268 could not determine their affinity. However Svein identified them as the cocoons of
269 representatives of the class Clitellata, which is in the phylum Annelidia (segmented worms),
270 and includes the leeches (Manum 1996; Manum et al. 1991b; 1992; 1994).

271 The communication of science was an enduring passion for Svein throughout his life,
272 and he frequently delivered lectures on scientific writing to students at the University of Oslo.
273 He was also heavily involved in scientific outreach to the general public, and published many
274 popular science articles (e.g. Manum 1960c; 1963c; 1966b; 1976; 2006; Manum & Bose
275 1988; Thomsen & Manum 2009).

276 This subsection has attempted to describe the scientific research of Svein Manum. In
277 recognition of this body of work, he was elected a member of the Norwegian Academy of
278 Science and Letters in 1980. Twelve years later, in 2002, the American Association of
279 Stratigraphic Palynologists (AASP) awarded Svein their Medal for Scientific Excellence
280 (Thusu & Vigran 2003). Svein has also been honoured by having dinoflagellate cyst taxa
281 named for him. The important Late Cretaceous–Paleocene cavate peridinioid genus
282 *Manumiella* was named after Svein by Bujak & Davies (1983, p. 160). Two dinoflagellate
283 cyst species, *Chatangiella manumii* Vozzhenikova 1967 and *Impagidinium manumii*
284 Matsuoka & Bujak 1988, were also established in his honour. In addition to his highly

285 significant efforts in research in palaeobotany and palynology, Svein undertook significant
286 administration duties. For example, he was head of the Department of Geology at the
287 University of Oslo for four different periods between 1971 and 1983, in addition to his
288 performing similar duties in Kampala between 1967 and 1970 (see above). Svein also served
289 on the Norske AGIP A.S. board between 1976 and 1989.

290

291 **6. Retirement (1995–2015)**

292 Svein Manum retired from the University of Oslo in 1995. His close friend and colleague
293 Jorunn Os Vigran retired from IKU in Trondheim one year later in 1996, however, continued
294 her work and kept an office in SINTEF until 2014. Svein feared that these retirements marked
295 the end of academic research in pre-Quaternary palaeobotany and palynology in Norway.
296 Following retirement, Svein remained very scientifically active until the last months of his
297 life. His enduring passion for palynology was eloquently expressed via correspondence,
298 interaction with colleagues and outreach papers. Svein enjoyed good health for many years
299 following retirement, with the exception of his bad hearing, which he resolved by using the
300 available technology. During the 2002 AASP award ceremony in London (see section 5
301 above), he was still fit enough to sit cross-legged on the floor and Svein amused the audience
302 by rising directly to stand on his head. He also pursued various interests outside palynology
303 including art, graphic art, literature, music, photography and poetry during retirement (Vigran
304 2016). Svein was the head of the Norwegian Society of Graphic Arts for many years.
305 Gardening was also a major pastime, both on the small family-owned farm and at his home in
306 Lommedalen, a village in Akershus County, west of Oslo in southeast Norway.

307 One of Svein's final duties was, with other colleagues, to open the new palynology
308 laboratory run by Wolfram Kürschner at the University in Oslo in 2014. For him it was a
309 watershed moment because, after nearly 20 years since he retired, pre-Quaternary palynology
310 in Norwegian academia was experiencing a renaissance. The future of the discipline he
311 pioneered in the 1950s and 1960s was secured for Norway. In recent years Svein's wife,
312 Randi, became ill and he spent most of his time taking care of her, until the last few months
313 which were spent in a nursing home.

314 Svein Bendik Manum was a pioneer in the study of dinoflagellate cysts, palaeobotany
315 and terrestrial palynology, both in Norway and globally, publishing many scholarly scientific

316 papers (Vigran 2016), in addition to having wide cultural interests. Specifically, he instigated
317 and nurtured pre-Quaternary palynology in his native Norway. Svein was one of the few
318 palaeontologists to be consistently eminent in dinoflagellate cysts, palaeobotany and
319 pollen/spores. Over an interval spanning ~50 years at the University of Oslo, he significantly
320 advanced our knowledge of clitellate cocoons, dinoflagellate cyst biostratigraphy,
321 morphology and taxonomy, the Mesozoic–Cenozoic macrofloras of the Arctic, and the
322 biostratigraphy and palaeogeography of the North Atlantic region. He taught numerous
323 undergraduate students, and supervised much postgraduate research, over a 33-year career at
324 the University of Oslo. Svein Manum will be very fondly remembered as an outstanding
325 friend and scientist by his many colleagues, not only in his native Norway, but all around the
326 world.

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