## *IN MEMORIAM*

# Prof. Dr. Göran Possnert
# (12.01.1951 – 10.10.2022)

Prof. Göran Possnert was Director of Tandem Laboratory and Head of Department of Ion Physics at Uppsala University, Sweden, for the period 1990-2017. During his long research career he became a prominent scientist in Europe and worldwide. The main areas of his investigations included radiocarbon dating, physical geography, macrofossils, oceanography and paleontology. The radiocarbon dating research was multidisciplinary on materials from tephra, sediment cores, macrofossils, archaeological artifacts. An important trend of his studies was focused on ice cores, Antarctic sea ice, deglaciation processes, climatic oscillations in postglacial time, etc. The Holocene research integrated issues from sedimentation processes, varves, pollen, climate change and human impact. Prof. Göran Possnert had established fruitful connections with colleagues from various countries and the scientific results were presented to the audience in more than 300 publications with over 8000 citations.

I met him in 1994 at a small meeting in Gotland, Sweden, organized by Prof. Lars Königsson, and was impressed by his erudition, active participation in the discussions, calm and friendly character. Our cooperation started several years later in 2000 when he kindly responded to my request to provide several AMS radiocarbon dates from a sediment core obtained from the glacial Lake Ribno Banderishko in the Northern Pirin Mountain (Tonkov & al. 2002; Tonkov & Possnert 2021). The urgent need of radiocarbon dates has always been a crucial issue for palynologists, paleoecologists, geoscientists and archaeologists in Bulgaria due to the absence of a national radiocarbon dating laboratory. In the subsequent years our joint research expanded on investigation of lateglacial and Holocene sediment cores from glacial lakes and peat bogs in various parts of the Rila Mountain. Thanks to the numerous radiocarbon dates reliable chronologies were obtained for the vegetation, sedimentation and climate changes during the last 15000 years (Tonkov & al. 2006, 2008, 2011, 2013, 2016; 2018, 2020, 2023; Tosheva & al. 2010). Of particular importance was the delimitation of the lateglacial oscillations synchronous in

time with the paleoclimatic signal from Greenland ice cores (INTIMATE event stratigraphy) and the detection of 8.2 ky cooling event at higher altitudes in early Holocene. In the last decade the research activity continued with a palynological study from Belasitsa Mountain (Tonkov & al. 2012; Tonkov & Possnert 2014) dating back to 8000 years which provided evidence for the spontaneous distribution of chestnut (*Castanea sativa*). Also, after a long period of break, the palynological investigation of peat bogs in the Vitosha Mountain was resumed with the publication of a detailed pollen diagram on the vegetation development, fire history and human impact in historical time (Tonkov & Possnert 2016, 2016a). Altogether, the substantial contribution and legacy of Prof. Göran Possnert to the elucidation of the postglacial vegetation, climate history and human impact in the montane area of Southwestern Bulgaria comprises over 70 radiocarbon dates (Table 1) and co-authorship of 15 research papers.

The jubilee symposium Centenary of Pollen Analysis which I attended was held in Stockholm in November 2016. The plans to meet each other after so many years and discuss also future perspectives were not realized due to unexpected circumstances in his family. Nevertheless, our cooperation and friendship continued until his last days. The untimely death of Prof. Göran Possnert is a great loss for his numerous friends and colleagues but, apart from the scientific merits, he will be also remembered as a nice person devoted to his large family and a good player of violin.

**Table 1.** Radiocarbon dates of samples from sites in Bulgaria provided by Prof. Göran Possnert

| Lab. code | Depth (cm) | $^{14}$C age (BP) | $^{14}$C age cal. BP, ±2σ (mid-point) | Material dated |
|---|---|---|---|---|
| **Rila Mountain** | | | | |
| **Lake Ribno, Northwestern Rila Mountain (Tonkov & al. 2011, 2013)** | | | | |
| Ua-40623 | 50-51 | 2106±30 | 1995-2150 (2070) | gyttja |
| Ua-40624 | 99-100 | 2569±30 | 2510-2756 (2630) | gyttja |
| Ua-40625 | 186-187 | 4192±31 | 4621-4840 (4730) | gyttja |
| Ua-40626 | 269-270 | 6359±37 | 6575-7741 (7160) | gyttja |
| Ua-40627 | 354-355 | 8540±42 | 9476-9550 (9510) | gyttja |
| Ua-40628 | 395-396 | 9662±47 | 10780-11210 (11000) | gyttja |
| Ua-39221 | 427 | 10139±52 | 11400-12050 (11725) | clay/gyttja |
| Ua-39222 | 437 | 10291±56 | 11800-12400 (12100) | clay/gyttja |
| Ua-39223 | 452 | 10465±53 | 12100-12700 (12400) | clay/gyttja |
| Ua-39224 | 472 | 11240±59 | 12990-13260 (13125) | clay/gyttja |
| Ua-39225 | 491 | 12346±67 | 14000-14750 (14375) | clay/gyttja |
| Ua-40629 | 498-500 | 12692±67 | 14650-15250 (14950) | clay/gyttja |
| Ua-39227 | 532 | 13483±155 | 15450-16650 (16050) | silty clay |

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| **Lake Trilistnika, Northwestern Rila Mountain (Tonkov & al. 2006, 2008)** | | | | |
| Ua-20688 | 50-52 | 1645±40 | 1690-1410 (1550) | gyttja |
| Ua-20689 | 105-107 | 2605±40 | 2790-2700 (2745) | gyttja |
| Ua-21598 | 150-152 | 3200±40 | 3550-3340 (3445) | gyttja |
| Ua-20690 | 202-204 | 3925±40 | 4450-4230 (4340) | gyttja |
| Ua-20691 | 240-242 | 4560±45 | 5330-5040 (5235) | gyttja |
| Ua-20692 | 308-310 | 6835±50 | 7760-7580 (7670) | gyttja |
| Ua-20693 | 368-370 | 8040±55 | 9150-8650 (8900) | gyttja |
| Ua-20694 | 396-398 | 8825±60 | 10200-9600 (9900) | gyttja |
| Ua-21599 | 457-459 | 11140±100 | 13450-12850 (13150) | silty clay |
| Ua-20696 | 468-470 | 11365±75 | 13500-13000 (13250) | silty clay |
| Ua-21600 | 481-483 | 12110±95 | 15350-13650 (14500) | silty clay |
| Ua-21601 | 489-491 | 12815±130 | 15950-14350 (15150) | silty clay |
| **Lake Panichishte, Core P-3, Northwestern Rila Mountain (Tonkov & al. 2020)** | | | | |
| Ua-61843 | 10 | 160±29 | 290-40 (165) | peat with plant remains |
| Ua-61844 | 35 | 388±29 | 510-320 (415) | peat with plant remains |
| Ua-61845 | 50 | 673±30 | 680-550 (615) | peaty gyttja |
| Ua-61846 | 70 | 1349±31 | 1320-1180 (1250) | peaty gyttja |
| Ua-61847 | 90 | 1643±30 | 1620-1410 (1515) | peaty gyttja |
| Ua-61848 | 110 | 1908±31 | 1930-1740 (1835) | peaty gyttja |
| **Lake Manastirsko-2, Central Rila Mountain (Tonkov & al. 2016)** | | | | |
| Ua-47271 | 26-28 | 1245±75 | 980-1300 (1140) | peat |
| Ua-49249 | 36-38 | 1517±31 | 1330-1530 (1430) | peat |
| Ua-47272 | 80-82 | 1915±38 | 1730-1950 (1840) | peat |
| Ua-48421 | 130-132 | 2703±41 | 2750-2880 (2815) | peaty gyttja |
| Ua-47273 | 180-182 | 3380±42 | 3480-3730 (3605) | peaty gyttja |
| Ua-48422 | 240-242 | 5858±47 | 6540-6790 (6665) | peaty gyttja |
| Ua-47274 | 280-282 | 7680±93 | 8310-8660 (8485) | peaty gyttja |
| Ua-47275 | 320-322 | 8972±106 | 9650-10400 (10025) | peaty gyttja |

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| Ua-47423 | 360-362 | 9732±75 | 11060-11270 (11165) | peaty gyttja |
| Ua-49250 | 388-390 | 10380±85 | 11950-12550 (12250) | gyttja |
| Ua-47276 | 405-407 | 11209±168 | 12700-13400 (13050) | gyttja |
| Ua-49251 | 413-415 | 11796±174 | 13250-14050 (13650) | gyttja |
| **Peat bog Vodniza, Central Rila Mountain (Tonkov & al. 2018)** | | | | |
| Ua-54136 | 71-73 | 877±26 | 720-910 (815) | peat |
| Ua-54137 | 151-153 | 1561±27 | 1390-1530 (1460) | peat |
| Ua-55775 | 214-216 | 2387±31 | 2340-2680 (2510) | peaty gyttja |
| Ua-54138 | 253-255 | 3168±28 | 3350-3460 (3405) | peaty gyttja |
| Ua-54139 | 333-335 | 5196±30 | 5900-6000 (5950) | peaty gyttja |
| Ua-55011 | 384-386 | 6756±35 | 7570-7670 (7620) | peaty gyttja |
| Ua-47275 | 441-443 | 7572±34 | 8340-8430 (8385) | peaty gyttja |
| Ua-54141 | 487-489 | 8501±35 | 9460-9540 (9500) | peaty gyttja |
| **Lake Vapsko-2, Southern Rila Mountain (Tonkov & al. 2023)** | | | | |
| Ua-59524 | 100-102 | 1307±30 | 1300-1170 (1235) | peat with plant remains |
| Ua-59525 | 200-202 | 3157±33 | 3460-3260 (3360) | peaty gyttja with fine sand |
| Ua-59526 | 300-302 | 4292±32 | 4960-4820 (4890) | peaty gyttja with fine sand |
| Ua-60670 | 385-387 | 5032 ±37 | 5900-5660 (5780) | peaty gyttja with fine sand |
| Ua-59528 | 492-494 | 5439±35 | 6310-6120 (6215) | peaty gyttja with fine sand |
| **Pirin Mountain** | | | | |
| **Lake Ribno Banderishko, Northern Pirin Mountain (Tonkov & al. 2002; Tonkov & Possnert 2021)** | | | | |
| Ua-14001 | 45 | 1340 ± 60 | 1310-1180 (1245) | *Pinus* sp. needles |
| Ua-13403 | 150 | 3800 ± 135 | 4420-3990 (4205) | *Pinus peuce* needle |
| Ua-12855 | 155 | 4270 ± 85 | 4990-4610 (4800) | chitin part of insect |
| Ua-12856 | 205 | 5780 ± 110 | 6720-6470 (6595) | *Pinus peuce* shoot |
| Ua-13404 | 230 | 7385 ± 140 | 8320-8000 (8160) | *Pinus* sp. needles and budscale |
| Ua-13405 | 285 | 9785 ± 360 | 11750-10350 (11050) | *Pinus* sp. needles; *Pinus peuce* needle |
| Ua-61849 | 290 | 10331 ± 57 | 12410-11950 (12180) | gyttja |
| Ua-61850 | 320 | 11030 ± 120 | 13100-12710 (12905) | silty clay |

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| **Belasitsa Mountain** | | | | |
| **Mire Gyola (Tonkov & al. 2012; Tonkov & Possnert 2014)** | | | | |
| Ua-43943 | 30-35 | 507±30 | 630-500 (565) | clay with sand |
| Ua-41527 | 120-126 | 1474±30 | 1410-1300 (1355) | clay with sand |
| Ua-43944 | 148-153 | 3277±30 | 3580-3410 (3495) | clay with sand |
| Ua-41249 | 176-190 | 7099±44 | 8010-7840 (7925) | clay with sand |
| **Vitosha Mountain** | | | | |
| **Peat bog Kumata-1 (Tonkov & Possnert 2016, 2016a)** | | | | |
| Ua-51516 | 41-43 | 291±31 | 460-280 (370) | peat |
| Ua-50937 | 62-64 | 751±25 | 720-660 (690) | peat |
| Ua-50938 | 92-94 | 1289±30 | 1290-1170 (1230) | peat |

**Acknowledgements** I am thankful to Britta Possnert, Prof. Ala Aldahan and Prof. Daniel Primetzhofer who shared useful information about the life and research of Prof. Göran Possnert.

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