

## BOOK REVIEW

**Taking the Back off the Watch: A Personal Memoir (*Astrophysics and Space Science Library Series Book 381*)** by Thomas Gold, edited by Simon Mitton. Berlin/Heidelberg: Springer, 2012. 234 pp. ISBN 978-3642275876.

Early in my career at Stanford University, in the course of a conversation with Leonard Schiff (then the Department Chair of the Physics Department), I asked him what he considered to be the most important characteristic of a successful scientist. He replied “strength of character.” Thomas Gold (always known as Tommy) had that characteristic in spades. He was not a physicist, nor a biologist, nor a geologist, nor a space scientist, nor an astrophysicist, nor a cosmologist—he was all of the above.

My first encounter with Tommy was in 1953, at a conference on “Gas Dynamics of Cosmic Clouds” in Cambridge, UK. There was discussion about geomagnetic storms, and their various components—the Sudden Commencement, the Main Phase, etc. No one was offering any convincing theoretical interpretation of these phases, when up spoke someone with a clear and confident voice. He argued that the only way to understand how the “sudden commencement,” with a timescale of minutes, could be initiated by a solar flare that had occurred perhaps a day earlier, was to attribute the sudden commencement to a shock wave that had traveled ahead of the material ejected by the flare (material that would subsequently initiate the main phase). He then went on to point out that it could not be a conventional hydrodynamic shock, because the mean-free path of the atoms, electrons, and ions was far too long to lead to a shock wave duration of just minutes. It had to involve the interaction of the electrically conducting gas with a magnetic field. Once stated, the interpretation was obvious! But it took someone with the intelligence, curiosity—and strength of character—of Tommy Gold to see it.

Some years later I was at a conference at the Villa Monastero at Varenna, Italy, on Lake Como. I had by then heard of Tommy’s athleticism (he was a formidable skier), but I was still taken aback by what I saw. There was a stone staircase leading down to an underground vault, and of course there were railings around the staircase. I saw a crazy man, who obviously had no concern for his life or limb, calmly walking on top of the railings starting where the steps began, and walking to the other end, where there would

have been a ten foot drop to the stone steps below! That was Tommy—fearless as always.

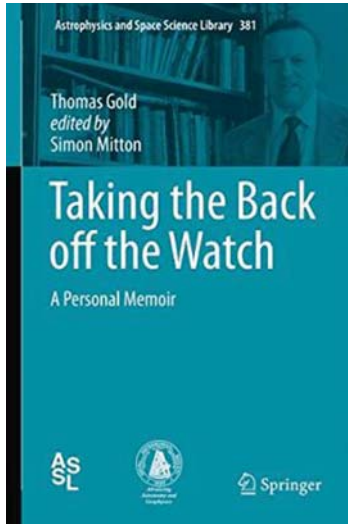
As a boy, I once asked permission to take an old alarm clock to pieces. Permission was granted, and I successfully took the clock apart and then reassembled it. Tommy, as a boy, achieved the far more impressive feat of opening up a Swiss watch, taking it to pieces, and then putting it back together! Hence the title of this memoir, *Taking the Back off the Watch*, which Tommy never completed in his lifetime (1920 to 2004) but which has been prepared for publication by Simon Mitton, who was himself once a young astrophysicist at Cambridge University. The life of Tommy Gold is a fascinating story, and we owe a great debt to Mitton for bringing it to publication.

Gold was born in Vienna in 1920 and lived there until 1930, when his family moved to Berlin. Tommy did not do well in the Berlin school, and the teachers suggested to his parents that Tommy might be mentally retarded! However, he excelled in gymnastics and learned to defend himself against the “ruffians and young thugs” a Jewish boy would encounter in Berlin in those days. In 1933, Tommy was sent to a school in Switzerland which—after Berlin—was a heavenly experience.

Tommy left Switzerland in 1938 to rejoin his parents, who had by then emigrated to England. He was admitted to Trinity College, Cambridge University, in 1939, but in May 1940 all persons in England with German or Austrian passports were interned. With other internees, Tommy was moved to an internment camp in Canada, where he had the great fortune of meeting Hermann Bondi, who would become a lifelong friend and collaborator. Tommy recounts an unpleasant experience at the hands of the commandant of an internment camp, and then advises us “Beware of humans when they are put in charge of other humans.”

Tommy was returned to England in 1941, and was able to resume his studies (in Mechanical Engineering!) at Cambridge. Once he had completed his studies, Tommy was sent to the Admiralty radar establishment in Surrey to become part of the theory section where he rejoined Bondi, and where he met Fred Hoyle who was in charge of that section. It was in this way that the famous trio of Bondi, Gold, and Hoyle came together.

When World War II ended, Tommy was temporarily given the illustrious rank of Wing Commander and sent to Germany with a small delegation to inspect and report on various scientific and technological centers in Germany. One night in Berlin, he was accosted by an American soldier who demanded that they take him to an address in Berlin. Somehow the interaction became hostile and the soldier produced a knife and began to attack Tommy. Tommy had as a boy learned how to fight, and he was able



to break the soldier's wrist and so survive a very dangerous situation.

I met Tommy—well after the War had ended—at the conference on “Gas Dynamics of Cosmic Clouds” mentioned earlier. However, my principal contact with Tommy occurred (probably in 1969) after the discovery of pulsars by Jocelyn Bell and Tony Hewish in 1968 at the Mullard Radio Observatory at Cambridge. My first thought was that pulsars had to be pulsating white dwarfs, and I developed a theory along those lines. Tommy's immediate interpretation was that they had to be rotating neutron stars. When he first asked for time at an astrophysical conference to present this idea, the conference chairman refused, saying “If I give you time for that, Tommy, I'll have people asking to present all kinds of crazy ideas.” Undeterred, Tommy gave his speech from the floor! Tommy got the basic idea correctly, but he did not go on to develop that idea into a theory, which is a problem I took on in 1970.

As one must expect of any creative scientist, Tommy had both hits and misses. The sudden-commencement model and his pulsar model were two of his hits. Another was his concept of the “magnetosphere” for the region far from the Earth's surface where the plasma “atmosphere” is dominated by the Earth's magnetic field. Another remarkable intellectual achievement was Tommy's theory that the ear is not a passive receiver of sound waves, but is a receiver that connects with an active transducer. Tommy proposed that theory in 1948, but it was not accepted by the biological community until 1998. Tommy could be years ahead of the establishment!

One theory that Tommy would have to abandon was his idea that the surface of the Moon would be covered by dust two or three feet thick. Most astrophysicists would also claim that he (and Hermann Bondi and Fred Hoyle) were off base in advocating the “Steady State” model of cosmology. Fred Hoyle had used the term “Big Bang” to denigrate the alternative idea of a sudden beginning of the universe, but the name has stuck!

Tommy took an active and creative interest in many other problems. One was the nature of radio sources being discovered by radio observatories, including the Mullard Radio Observatory under the direction of Martin Ryle in Cambridge in the 1960s. The distribution of sources appeared to be

almost isotropic, so they had to be either very close by (inside our galaxy) or extragalactic. Ryle initially went for the first option and Tommy for the second—which proved to be the correct choice.

Tommy took an interest in the intriguing problem of finding a mechanism that can explain the polarization of starlight—now believed to be due to asymmetric interstellar grains that are aligned either by magnetic field or by flow-fields in the interstellar gas.

Tommy was never afraid of controversy, once saying “For a theory to be useful, it should be wrong” (intended meaning debatable of course). One of Tommy’s theories (which almost all scientists would consider to be wrong) is that oil has a geological origin, not a biochemical origin. He was successful in getting a Swedish oil company to drill through 500 meters of rock, an experiment that produced oil, but only a very small amount. That test argues against Tommy’s theory, but it does not absolutely disprove it.

If I could bring back to Earth one of my erstwhile colleagues to talk over my current research (the influence of neutrinos on beta decays), it would be Tommy. It is unlikely that he would immediately accept the reality of the phenomenon—still less immediately accept my theory—but he would certainly bring to the discussion an open and inquiring mind—which is all one can ask of a true scientist.

**PETER STURROCK**