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# mnassa

monthly notes of the astronomical society of southern africa

Vol 71 Nos 11 & 12 December 2012


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**Centenary: Cape Astronomical Association**

The meeting that founded the Cape Astronomical Association was held a century ago in Cape Town – on 8 November 1912. The cover picture is a composite of the original proposed goals document of the society, overlaid by pictures of the leading lights during those forming years. See the article by Chris de Coning on p.235.

Astronomical Society of Southern Africa
ASSA
# mnassa
Monthly Notes of the Astronomical Society of Southern Africa
Vol 71 Nos 11 & 12 December 2012

obituary

## William Gordon Pearson (1939 – 2012)

William Gordon Pearson died in Pinelands on 17 October 2012 at the age of 73. Affectionately known as Billy, Bill or sometimes Willy by colleagues and friends, but his family called him William. He was born with scoliosis, but never let this physical disability stand in his way to do what he wanted. He certainly never made it an excuse for not doing anything. To all who knew him, Billy was a special person.

He was born on 24 March, 1939 in Cape Town and attended boarding school in Kimberley. Here he began his formal technical training, which included Woodwork, Watch-making and Radio Technology. On his return to Cape Town, he served an apprenticeship at Plessey and later worked for Marine Diamonds. In 1966 he started as technician at the, then Royal Observatory of the Cape (now SAAO) where he remained until retirement in March 1999.

Even though Billy finished up in the Electronics Department of the Observatory, in the early days such a department did not exist and the work was more electro-mechanical. This suited him perfectly because Bill had an amazing mechanical insight. Often he would spend time observing, either by himself, or with an astronomer, to make sure that the instrument he had made/designed was working properly. He also made an enormous contribution to getting SAAO up-and-running during the move from Cape Town to Sutherland, spending extended shifts up there. Billy had the "honour" of doing the actual grand opening of the 30-inch dome at the official inauguration of Sutherland – "honour" in quotes because he had to do it manually, behind the scenes, after the people who pitched the marquee, put a spike through the mains cable! Although Billy retired just as the SALT project became a reality, the last project he worked on at the Observatory (on contract, after retirement) was the automation of the SALT model. To his regret, he was not able to personally install it in the Sutherland Visitors' Centre since he had more and more trouble breathing at altitude, as he grew older.

Willy had an enquiring mind and spent hours figuring out how things worked: he wouldn't be happy fixing anything until he fully understood how it worked! After that he would enthusiastically share his knowledge to anyone who shared this desire. He was never happy with a "this will do" approach, if anything was worth doing it had to be done properly. The hallmark of his work was his precise, and sometimes pedantic, professionalism. This quality, together with his mechanical insight, excelled even after retirement when he "specialised" into fixing sewing machines. This he did so well that he soon got flooded with work, such that there are numerous sewing machines and over-lockers, declared "unable to repair" by their dealers, still working today. A not so well known fact is that Billy was involved in the development of the first heart pacemaker in South Africa.

In spite of his disability Billy was an enthusiastic sportsman, and remarkably, was the Western Province Champion in the 350 cc motorcycling class. He also played badminton, and those sports he couldn't play he would watch on television, specially cricket, rugby and F1 Grand Prix racing. But sailing and the sea were his real loves. This started off in his youth, crayfishing off Bakhoven from homemade metal canoes. He was an active member of the Royal Cape Yacht Club (RCYC) and a sought after crew member because of his agility on deck and for his ability scaling masts! He regularly took part in the Wednesday Racing League at the RCYC.

Willy was also a member of "Ollies", more properly known as *Olympics*, where he had his place and held court on club matters, and could hold his own in the friendly bouts of repartee! He had a mischievous sense of humour and enjoyed a good joke or laugh, but never at anyone's expense.

William was a committed and devout family man, having married Margaret on 10 April 1965. It was indeed a long and happy marriage, one between two people who deeply cared about each other. They had two daughters, Judy and Cathy, with whom he shared much time and formed a special bond with each. As was to be expected, he also shared quality time with his grandchildren, Jessica, Ashleigh, James and Little Jess.

Billy was a remarkable man who will be hard to forget, primarily for his positive approach to life: "Per Aspera Ad Astra (Through Adversity to the Stars)". ☆

# Patrick Moore (1923 – 2012)

Patrick Alfred Caldwell-Moore, British eccentric, astronomer, television presenter, writer and great populariser of science: born 4 March 1923 – died 9 December 2012.

Born in Pinner, west London, Patric was the son of Captain Charles Caldwell-Moore, MC, who died when the boy was very young, leaving him in a tenacious relationship with an ex-opera singer mother, Gertrude, whom he adored and felt to be his only security. She was also an accomplished artist, as was evident from her amusing illustrations, such as a Christmas card showing Martians on canals.

Because of a heart condition, he was largely educated at home by tutors and his mother. Possessed of perfect pitch, he played and composed for the xylophone from the age of 12, but was even more precocious in astronomy. When he was six, his mother gave him George F Chambers's 1898 *Story of the Solar System*, which he read curled up on a dining room chair – and kept all his life.

Moore became a member of the British Astronomical Association at 11. In 1936, at age 13, he published *Small Craterlets in the Mare Crisium*, his first scientific paper on the Moon. Even his small telescope could show up a great deal of detail on the Moon's surface, making it especially attractive to amateur astronomers at a time when professionals tended to neglect it.

But for the second world war, he had intended to go to Cambridge University. In order to enter the RAF, he not only lied about his age, but also got someone else to impersonate him and take the medical for him, so that he could conceal his heart problem. He trained as a navigator on bombers, later sometimes reminiscing about flying over Germany on Pathfinder flights. He maintained that though he had been compelled to learn how to fly, he was not acceptable to the RAF as a pilot because he always flew with one wing lower than the other. While he was in hospital after an injury, his heart condition was

**Sir Patrick Moore recording the 650th edition of *The Sky at Night* for the BBC at his home in Selsey, West Sussex in 2006. Photograph: Roger Bamber/Rex Features**

discovered: he relinquished his commission in 1944 and took up the defusing of bombs.

Later he became an air training corps officer in the voluntary reserves, reaching the rank of squadron leader. Some of the sights of suffering he had witnessed sickened him and fuelled his hatred of Germans; and he returned to civilian life in a robust, even bellicose, state of mind. Unlike many servicemen colleagues, he refused to accept a grant to go to university, protesting, "Either I do a thing myself or I don't do it at all." He turned to teaching, but in 1952 gave that up to become a freelance author, writing children's novels.

On the subject of flying saucers, then very much in vogue, Moore maintained that he kept an open mind, though he may have said this purely to provoke discussion: he was involved in at least one hoax to show how easy it was to get the public to believe they had seen one. His friend Douglas Leslie felt that Moore would have enough to say on the subject to put him forward for a discussion programme on BBC television dealing with UFOs. The producer Paul Johnstone was then looking for an astronomer-presenter, and so in April 1947 Moore appeared on the first edition of *The Sky at Night*.

Johnstone had found both the right presenter and the right moment. The Russians were about to launch Sputnik 1, the first artificial satellite. Moore's programme recorded most of the rapid developments in the space field. The Russian Lunik 3's first pictures of the far side of the Moon were quickly on the air, and when Lunik 4 missed the Moon by 8 000 km and all the British astronomers delegated to watch it were defeated by bad weather, Moore had "one of my first experiences of what is known in broadcasting jargon as padding". His ability to think on his feet and to talk so fast that critics were never quite sure of what they heard, was vital.

With one exception after his teaching days – his directorship of Armagh Planetarium in Northern Ireland (1965-68) – Moore was never an employee. Often hard-up, dependent on battered old cars and bicycles, he gave his time readily to a large number of international organisations including his honorary membership of the Astronomic Society of the USSR. He maintained loose links with Russian astronomers, in spite of many obstacles when the cold war was still on.

He was appointed OBE in 1968, CBE in 1989, and knighted in 2001. In his old age he became a more broadly based television personality, complete with eyeglass, bushy brows, enormous bulk and a liking for mustard tweed suits that would have been looked upon with caution by an old-fashioned bookmaker. Sir Patrick Moore, who has died aged 89, had the air of a crusty, uncompromising bachelor and slightly dotty boffin who could have walked straight out of a Victorian or Edwardian novel. An amateur but distinguished astronomer, star of television programmes including *GamesMaster*, prolific author, composer and manic xylophone player, he was a true, quite unselfconscious British eccentric – and a populariser of science without equal in an era of great but often abstruse discovery.

In his capacity as an astronomer, he helped map the Moon and was for more than half a century until his death the presenter of BBC TV's *The Sky at Night*, missing only a single episode through illness, in July 2004. The following year the programme spawned a monthly magazine. *The Sky at Night* appealed hugely to laymen as well as experts. This was largely because of Moore's ability to make inspired connections and analogies: linking the Milky Way to a fried egg, a solar eclipse to a Spanish taxi-driver and the Moon to a dog walking uphill. Few people with degrees in science – he had no degrees in anything except many honorary doctorates – could have held the audience so imaginatively and with so little self-importance.

This emphatic choice of words was characteristic of his machine-gun delivery – he could talk at 300 words a minute (and type at 89.6 words a minute). But it did not put off media interviewers who dug for explanations of why he had never married. Moore would say that his fiancée had been killed in the war and he would not settle for second best. Until the mid-1960s he lived with his mother in East Grinstead, mid-Sussex, where he was a leading light in the chess club, and then in a handsome house made from several cottages in Selsey, on the West Sussex coast, until she died at 94 in 1981. He lived alone for many years after that, but then shared his home with a godson.

It was one of the ironies of Moore's altogether strange life that, while he was quite comfortable thinking in cosmic terms as an astronomer, and could envisage forms of life similar to our own out there in space, he was in political thinking a Little Englander, always harking back to 1940 and Britain's finest hour as the yardstick by which to judge contemporary happenings. But Moore was never a stereotype rightwinger or anything else, as his strong denunciation of hunting as an unnecessary cruelty ("but you can't argue with these filthy people") demonstrated. He was in several respects simply the archetypal cocksure small boy who never grew up, typing his more than 100 books, including many editions of the *Guinness Book of Astronomy Facts & Feats*, on the 1908 typewriter he had been given as a boy of eight. He also harboured the cuckoo clock he was given for his seventh birthday, the telescope he bought for seven shillings at ten, and the boy's bike he rode until his late 70s, when he had to have a replacement knee and his bicycle was not in first-rate form either.

If Moore had an unusual life – ultimately relenting on his suspicion of autobiographies, so that his *Eighty Not Out*, with paring personal details, appeared in 2003, and as a paperback in 2005 under the title *Patrick Moore the Autobiography*. About his personal life he was always reticent.

When TV Astronomer: *Thirty Years of the Sky at Night*, was published in 1987, readers were told: "This book is in no way meant to be an autobiography, if only because nobody would be in the slightest degree interested."

As a musician, his output included operas, and once, at the Theatre Royal Bath, he played 21 xylophone pieces, 19 of which he had written himself. In evening dress with his shirt-front threatening to take off at any moment, he played the same instrument on the Room 101 "pet hates" television programme in 2002 after telling Paul Merton that he hated plastic food wrappers, "too many female teachers" and the Archbishop of Canterbury for not denouncing hunting.

He captained the local cricket team and was a formidable bowler until he had to have an artificial knee. One explanation for his use of a monocle in later life was the eye injury he suffered when fielding in the slips at too great an age.

In the late 1980s he formed his own political party, the United Country Party, for those who had "common sense" and who wanted an end to inflation, rubbish rotting in the streets and immigration. He was a friend of Norris McWhirter and his right-wing Freedom Association.

Though his opposition to immigration and, latterly, Britain becoming "a dumping ground" for economic as distinct from political refugees, alienated many leftwingers, he was too patently against human or animal suffering and too scatter-gun in his beliefs to make such critics more than mildly uncomfortable.

His attitude to party politics in general was indicated by his flirtation with the Monster Raving Loony Party on the grounds that they "had one advantage over all the other parties – they knew they were loonies". His highly individualistic attitude to organisations in general was well summed up when he once observed, "I'm thinking of starting the Politically Incorrect School of Sociology – and the acronym says it all." The initials were indeed just what he thought applied to so much of the modern world.

In the 1990s he announced that he would not back the Tories again because they were in favour of hunting. He founded the Halley Club (after the comet), which had no subscription, no rules, no aims or objects. He described it himself as the "most useless club in the world – after the European Parliament, of course", and went on to support Ukip.

His tireless work explaining the wonders of the universe - punctuated by his mantra of scientific inquiry, "We just don't know" – was altogether more creditable and important.

**Brian Warner, emeritus professor of astronomy, University of Cape Town, writes:** There are many individuals in successive generations of professional astronomers who owe a great deal to the books and personal support of Patrick Moore. He introduced children of all ages to astronomy, and some of them became prominent professionals in astrophysics and planetary sciences.

Having, as a schoolboy, lived within bicycling distance of Patrick's house in East Grinstead, I benefited from his encouragement and generosity of time and, indeed, from his introduction to those who were later to become my teachers and mentors. And I still value the inscribed books he gave me during those years. The scope of his books went well beyond introductory and popular texts – his early lunar and planetary publications were well-rounded reviews that included much from the professional literature. Some books, such as the one on Neptune (1989), were useful contributions to the history of astronomy.

Patrick's eccentric presence and encyclopedic knowledge, as a radio voice and TV personality present at many of the significant astronomical and space related events over more than half a century, steadily maintained public interest in the subject and helped encourage the large increase in entrants to university astronomy courses. Other sciences should have been so lucky. ☆



# History of the Cape Astronomical Association

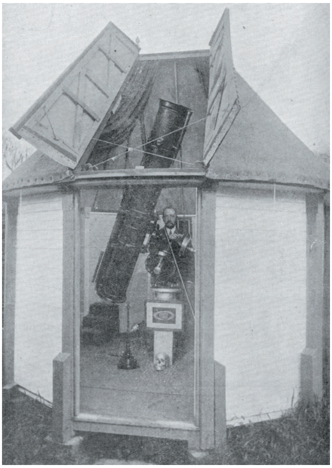
Chris de Coning, *siriusa@absamail.co.za*

### Introduction

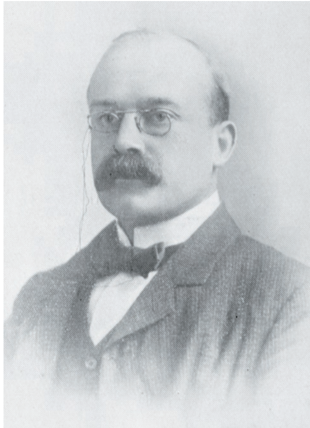
Roughly one hundred years ago a unique event took place in South Africa. An advertisement was placed in a Cape Town newspaper calling on all interested parties to attend a meeting in order to establish an astronomical society. This was to be the first ever astronomical society in South Africa! 2012 is the centenary of this first astronomical society in South Africa.

### Events leading up to the Society

In 1910 a spectacular comet graced the night sky. It was very much an anticipated event as this was the return of Halley's Comet. What was unanticipated was that it would be so spectacular. The world became temporarily obsessed with astronomy. Mr Clement Jennings Taylor, an amateur astronomer living in Cape Town with a 10-inch telescope, published a map of the path of the comet and wrote a series of articles in a local newspaper which raised public interest. After Halley's Comet faded away, another comet was discovered by Mr J.F. Skjellerup, once again a Capetonian, which revived interest in astronomy (Long, pp.153-154 ; Smits, pp.79). It was an exciting time for anyone interested in science and adventure. Robert Peary reached the North Pole in 1909. Scott was anchored in Cape Town in June 1910 in his attempt to reach the South Pole first, but was beaten to the goal by Roald Amund-



(left) Clement Jennings Taylor was a cloth merchant. He published a map of the path of Halley's Comet and wrote a series of articles in a local newspaper which raised public interest and helped to lead to the establishment of the CAA. He was not one of the founder members but joined the association at a later date and became one of the Vice-Presidents. Taylor discovered a comet (Taylor, pp.30-31; Long, pp.153-154 ; Smits, pp.79).



Sydney Samuel Hough was a brilliant mathematician and was appointed as H.M. Astronomer. He was Honorary President of the CAA and first President of ASSA (Hough, pp.27-31).

sen in December 1911. Machu Picchu was discovered by Hiram Bingham in July 1911 and the sinking of the Titanic in April 1912 was still a recent memory (Furtado; Uys, p.64).

**Founding of the Society**

Mr D. Gordon Mills took the initiative and placed an advertisement in the Cape Argus on 3 October 1912. It must have been in a moment of great inspiration and haste as the meeting was to be that same evening. Thirteen people showed up for the meeting at 8 o'clock at the Rooms of Photographic Society, Old Town House on Greenmarket Square (Long, pp.154-155).

Right from the start there was great emphasis on the close co-operation between amateur and professional astronomers. It was felt that the Astronomer Royal, SS Hough (see picture), should be the President of the fledgling society. As he was not present at this event the meeting was disbanded with the purpose of asking Mr Hough if he would be President. It was decided at the meeting that it was desirable to form an Astronomical Society and Messrs Davis, Long, Mills, Skjellerup and Steer were appointed as a preliminary committee to draw up a scheme (Long, p.154). Of the 13 people present three were women. This was the era of the emancipation of women and in 1912 Cape Town proclaimed an ordinance giving female property owners the right to vote in municipal matters (Uys, p.65). The list of names is given in Annexure 1.

Correspondence was entered into between Gordon Mills and Hough. A letter

(left) John Francis Skjellerup was Australian born. He came to South Africa as a telegraphist. Skjellerup discovered 7 comets, five of which bears his name and he was an avid Variable Star Observer (Orchiston, pp.56-75).
(right) Walter Hubert Cox, an astronomer at the Royal Observatory at the Cape. He appeared in amateur operatic performances and was the Singles Tennis Champion of the Western Province in 1895 (Cox, pp.85-86)

arrived at the Royal Observatory on 29 October 1912 (letter, Gordon Mills to Hough). Hough replied on 30 October accepting the invitation and agreeing to be President (letter, Hough to Gordon Mills). Close co-operation between amateur and professionals was now assured in South Africa.

The meeting that can be labelled "the Founding Meeting" was held on held on 8 November 1912 (Constitution of A.S.S.A. (1921), p.1). The list of people that is considered to be the founding members is given as Annexure 2. Their occupations varied from working at the post office to medical doctors and a senator in Parliament.

The Association was inaugurated on 13 December 1912. The chosen name was the **Cape Astronomical Association** (CAA). As some of those present were members of the British Astronomical Association (BAA) they modelled themselves on this society. The meeting was presided over by the Hon. President, S.S. Hough. Dr J.K.E. Halm delivered an inaugural address followed by a lecture on spectroscopy, which was illustrated by lantern slides. The attendance at the meeting numbered forty-two (Long, p.155). Thus the influence of Halley's Comet helped to form the Association. According to Houghton there was a precursor movement to the society. For more information See Annexure 4.

**History of the Society**

Unfortunately we do not know much about the early years of the society. There are not any known source materials left from the original meetings. What we do know is based on the Presidential Address (lectures) of two of the past Presidents of ASSA, i.e. Long (Long, pp.153-181) and Smits (Smits, pp.79-93) which were published, as well as an excellent article written by Houghton on Early Amateur Astronomers (Houghton, pp. 45 – 52). There are also sporadic explanatory notes interspersed in early publications of the Constitution. Although we do know who founding members were, due to our lack of knowledge about the early society we

**Jacob Karl Ernst Halm obtained a Doctorate in Philosophy of Mathematics. Over time he turned his skills to Astronomy and became Chief Assistant at the Royal Observatory. Halm was the first astronomer to suggest the existence of a mass-luminosity relation in stars. He was a gifted musician (*MNASSA* 1987, Vol. 46 p.113; Halm, p.96).**

do not know what decisions were made, or who sat on council. We do not know if the association had a logo or an official letterhead.

We do however know where some of the meetings were held:

- The first few meetings held in 1912 to 1913: Old Town House, Rooms of Photographic Society (until it became Michaelis Art Gallery (Long, pp.154-155).
- Meetings for April and May 1913 were held at Training College, Queen Victoria St. This was the New Huguenot Hall of the Dutch Reformed Church (Long, pp.155-156).
- South African Mutual Assurance Building (Long, p.156).

It is heartening to read of the first Observation evening. Members set up their telescopes at the Rhodes Recreational Grounds, Mowbray in July 1914 (Long, p.157).

By this time world events overtook our league of intrepid astronomers. World War One broke out in June 1914 (Long, p.157). Priorities changed and men went off to war. During the latter half of 1914 all activities of the society ceased for about two years.

**Reconvening of the CAA**

Halfway through the War some of the members decided to reconvene the society. Very little is known. The first meeting was at the YMCA Hall in Long St, later to become the offices of The Eastern Telegraph Company (Long, p.157) and we know that Mr Alfred Bull was involved (Bull – Obituary, p.237). At a Special Meeting in August 1916 it was decided to hold the Annual General Meeting (AGM) in June of each year. We know that this meeting was held at the “Cape Town Gallery Club Room”, Burmester’s Building in Adderley Street (Long, p.158). There was also a public outreach during the total eclipse of the Moon on 4 July 1917, when members set up telescopes at the Corporation Street entrance of the Cape Town City Hall.

At the time when the War in Europe was still consuming many South African soldiers, the State of Israel was created in 1917 by the British Balfour declaration and the October Revolution took place in Russia (Furtado). Changes concerning academic development were afoot in South Africa. In 1916 the University of Cape Town was created through an act of Parliament and in 1918 Victoria College was renamed the University of Stellenbosch (Uys, pp.67-8).

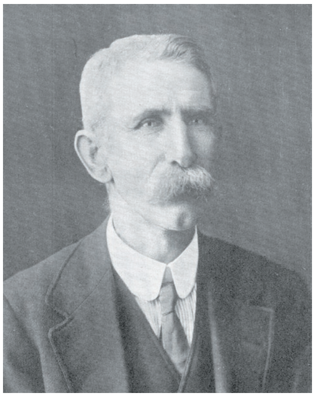
Our knowledge of the Association and its doings greatly improved when the bold step was taken to print publications. They were simply known as "*Circulars*" and between 1918 and 1922 a total of eight *Circulars* were published. Four of them were the minutes of the AGM's held from 1918 to 1921. The other four were publications of talks given to the Association and are of particular interest. From the *Circulars* we know what decisions were made and who were elected to office.

In the article by Long he mentions that in 1913 a Mr Connel gave a talk entitled "Reminiscences of an amateur astronomer in India". The talk was enhanced by printed copies of the talk. According to Long, this is the first true publication of the society. Unfortunately we do not have a copy of this paper (Long, p.157).

Because of the information contained in the *Circulars* we know of discoveries made by members of the CAA:

- 8 June 1918: Nova star discovered by Mr Watson of Beaufort West. Co-discoverer, Dr Anderson of Edinburgh (AGM 1918, p.1)
- 11 June 1918: Comet discovered by Reid (AGM 1919, p.6)
- 18 Dec 1919: Comet discovered by Skjellerup (AGM 1920, p.5)
- 11 Dec 1920: Comet discovered by Skjellerup (AGM 1921, p.6)
- 13 March 1921: Comet discovered by Reid (AGM 1921, p.6)

The Great War ended on 11 November 1918, but just before peace was declared fate delivered a harsh blow. In September 1918 the Spanish Flu reached Cape Town. By October 120 000 people had influenza of whom 6 000 died in the first two weeks (Uys, p.68) During this time the Comet section made no observations because Reid was quite ill (AGM 1919. pp.5-6). Hough's wife died as a result of the epidemic (Hough - Obituary, p.28).



**William Reid moved from Scotland to Cape Town for health reasons. His hobbies included entomology and astronomy. He became director of the Comet Section of the CAA and discovered six comets. He was also President of ASSA (Reid; pp. 129 - 130).**

Meetings were held from the 12 June 1918 at the premises of the Owl Club in Burg St (AGM 1918: AGM 1919). The Owl Club is a society for wise people, as in the wise Owl. In 1920 the meetings were held at the premises of the Medical Association at 35 Wale St (AGM 1920, p.2).

In 1919 Arthur Eddington verified Albert Einstein theory by observing the position of stars during a solar eclipse. The *Circulars* never mention anything of this great event.

By this time the CAA had membership from as far afield as Southern Rhodesia (Zimbabwe) and Grahamstown. The Association survived the War and the influenza epidemic and was about to morph into a new society. In 1917 the then secretary of the CAA, Theodore MacKenzie, moved to Johannesburg. With the goodwill of the CAA he started a similar Association. The founding meeting of the **Johannesburg Astronomical Association** (JAA) was held on 28 February 1918 with R.T.A. Innes, Union Astronomer, as President. It was not long before the vision of an overarching organisation for Astronomy in South Africa developed, but for practical reason it was decided to have localised centres. A letter was drafted by the CAA and read at a meeting of the JAA on 22 July 1921 suggesting that the two Associations merge into a new Society (Long, p.164) By 12 July 1922 a special meeting was held in order to vote on the proposal to amalgamate with Johannesburg Astronomical Association and form a new body to be called the **Astronomical Society of South Africa** (ASSA) (Letter Schonegevel). According to the article by Long ASSA officially came into existence on 1 July 1922 with a membership of 61 people. However this was before the CAA voted on the issue on 12 July 1922. Due to a lack of other available material we are not entirely sure of the founding date of ASSA (Long, p.168). The list of members of Council is given in Annexure 3.

**Objectives and Structure of the Society**

A rough draft of the proposed goals of the society can be seen on p.241. Unfortunately the document is not dated, but it is referred to in a letter dated 13 November 1912. Listed below are the formal Objects of the society as published in 1921, a year before the CAA ceased to exist. The goals are more elaborate than the goals stated here, but the document gives us a good idea of how the ideas progressed over time.

The objects of the society were:

(a) To encourage the study of the science of astronomy in all its branches.

(b) To establish an association of observers and students.

(c) To organise Observing Sections.

(d) To disseminate current astronomical information and to encourage a popular interest in astronomy.

(e) To hold periodical meetings for the purpose of lectures, the reading of papers and discussions.

(f) To publish such matter as may be deemed advisable by the Council of the Society.

(g) To form a library of astronomical

literature for the use of members and associates.

(h) To acquire a collection of lantern slides for use at the meetings of the Society and for loan or hire at the discretion of the Council.

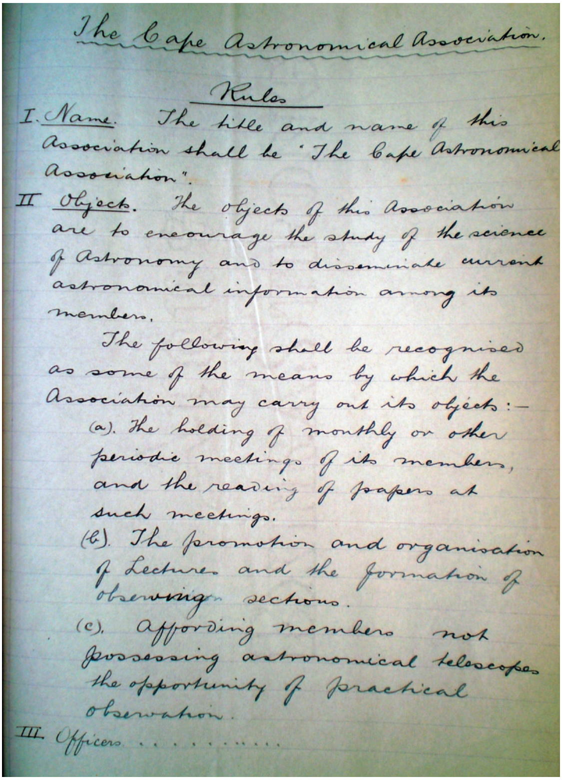
(i) To afford members and associates not possessing astronomical telescopes, the opportunity of practiced observation.

(Constitution of A.S.S.A. (1921), p.1; AGM 1921, p.16)

The Constitution as published in 1921 states that the Society shall consist:

(a) of a Honorary President,
(b) of not more than four Honorary Vice-Presidents,
(c) of not more than ten Honorary Members,
(d) of Ordinary Members,
(e) and of Associates. (Constitution of A.S.S.A. (1921), p.1; AGM 1921, p.16)

The list above states the intention, but in reality there was a two tier system with two sets of Presidents and Vice-Presidents. The first set consisted of an Honorary President assisted by two vice-Presidents. They played no active role in the society but lent credence to the establishment. Hough was elected and remained the Honorary President throughout the existence of the CAA. There were various Honorary Vice-Presidents. The second tier did all the work and was tasked with the running of the society. This tier consisted of the President and two vice-Presidents, a hon. secretary, hon treasurer and hon librarian, as well as four committee members. When ASSA was established the two tier system fell away (AGM 1918, p.7; AGM 1919, p.6; AGM 1920, p.1; AGM 1921, p.1; Long, p.154).



The Cape Astronomical Association.

Rules

I. Name. The title and name of this Association shall be "The Cape Astronomical Association".

II Object. The objects of this Association are to encourage the study of the science of Astronomy and to disseminate current astronomical information among its members.

The following shall be recognised as some of the means by which the Association may carry out its objects:—

(a). The holding of monthly or other periodic meetings of its members, and the reading of papers at such meetings.

(b). The promotion and organisation of Lectures and the formation of observing sections.

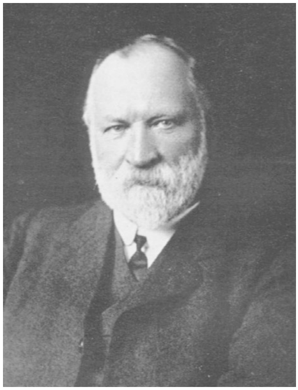
(c). affording members not possessing astronomical telescopes the opportunity of practical observation.

III. Officers . . . . . . . . .

**Rough draft of the Name and Objects of the Cape Astronomical Association. The handwriting is assumed to be that of Mr Skjellerup (S.A.A.O. Archive; Royal Observatory Cape of Good Hope; S - Societies; 1907 - 1928).**

One of the objectives was to organise observing sections. In his Presidential Address Long stated that at the inauguration meeting held on 13 December 1912 Mr Reid was appointed as the director of the Meteor section (Long, p.155). In all subsequent correspondence this section is referred to as the "Comet Section". This may have been an unimportant slip as the logical name currently is the "Comet and Meteor" Section. Mr Reid remained the director throughout the existence of the CAA.

A Variable Star section was proposed at the same meeting, but A.W. Roberts, the acknowledged expert in variable stars and one of the founding members at the previous meeting but living in the Eastern Cape was not present at the meeting. The matter was deferred. The section was created in March 1914 under the directorship of Reid (Long, pp.154-155, p157; AGM 1918, p.7; AGM 1919, p.6; AGM 1920, p.1; AGM 1921, p.1;). He was now the director of both observing sections. Then the Great War intervened and by the time the association was reconvened Mr Skjellerup was an avid variable star observer and was appointed director.



**Alexander William Roberts settled at Lovedale in the Eastern Cape where he distinguished himself as an excellent teacher. He became one of the foremost Variable Star observers of his time. General Smuts appointed Roberts as Senator (Roberts, pp.93-94).**

**Conclusion**

As a result of a spectacular display by a comet and the entrepreneurship of a few avid amateur astronomers, the Cape Astronomical Association was formed. As a result of the diligence of its members, both amateur and professional, the society has persisted and has adapted to keep up with the times. In the last few years modern technological advances have challenged the society and forced some changes. However the social aspect of astronomy expressed as "societies" has survived one hundred years.

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**Abbreviations**

*JASSA*: Journal of the Astronomical Society of South Africa.

*MNASSA*: Monthly notes of the Astronomical Society of Southern Africa.

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- Letter Gordon Mills to Hough: S.A.A.O. Archive; Royal Observatory Cape of Good Hope; S – Societies; 1907 – 1928. (\Correspondence > 001a & 001b)
- Letter Hough to Gordon Mills: S.A.A.O. Archive; Royal Observatory Cape of Good Hope; S – Societies; 1907 – 1928. (\Correspondence > 002)
- Letter Schonegevel: Source: S.A.A.O. Archive; Royal Observatory Cape of Good Hope; S – Societies; 1907 – 1928. (\Correspondence > 012)

**Annexure 1**

First meeting of 3 October 1912 at 20h00, held at the Old Town house in Cape Town: Those present were: Miss A Glossop, Miss Ellen Smith, Messrs JW Copenhagen, SA Davies, RT King, AW Long, Andrew Milne, DG Mills, William Reed, HW Schonegevel, JF Skjellerup. EJ Steer and John Williams. (Long, p.154)

**Annexure 2**

The Second and what is referred to as the founding meeting held on 8 November 1912, time unknown and it is assumed that the meeting was also held at the Old Town House. The roll of foundation members and the positions elected: (Houghton; Long, p.153; Constitution of A.S.S.A. (1921), p.1)

- Hon. President: Mr S.S. Hough - His Majesty's Astronomer.
- President: Dr J.K.E. Halm.
- Vice-Presidents: Dr S.J. Lunt and Senator A.W. Roberts.
- Secretary and treasurer: Mr J.F. Skjellerup.
- Committee: Mr S.A. Davies, A.W. Long, D. Gordon Mills and W. Reid.
- Miss A. Glossop, H. Long and E. Smith; Mr W.H. Cox, R.T. King, A. Milne, A. Pilling, E.J. Steer, S. Sangster, H.W. Schonegevel and J. Williams.

**Annexure 3**

The first Council of the Astronomical Society of South Africa as elected for 1922 - 1923: Smits, p. 82.

- President: Mr S.S. Hough - His Majesty's Astronomer.
- Vice-Presidents: Dr J.K.E. Halm; Senator A.W. Roberts and Mr W.B. Jackson
- Secretary: Mr T. MacKenzie
- Treasurer: Mr J.F. Skjellerup
- Members of Council: Mr W. Watson; A.W. Long; W. Reid; H.W. Schonegevel, H.E. Wood and W.M. Worssell

**Annexure 4**

According to an article published in *MNASSA* by Houghton, there was an event in Beaufort West that preceded the CAA and may have helped the formation of the society. An excerpt of the article titled "SOME SOUTH AFRICAN AMATEUR ASTRONOMERS" is given below (Houghton, pp.47-8):

My information [Houghton] is derived from an article in the Press by Mr R. Watson in 1928. He wrote: "Many years ago there existed in Beaufort West a small club. It had neither name, subscription nor membership roll. Its headquarters was a tailor's shop and its president the tailor. There the savants of the dorp used to congregate at their own time and pleasure to discuss with the president and one another the whole riddle of the universe. There was quite a variety of interests represented - farmers desirous of growing long and yet longer wool, engine-drivers anxious to know the best means of boiling water and the correct way to act in a collision, clerics interested in fossils, a plumber, a budding architect, a boot-seller etc., all desirous of hearing the words of wisdom that fell from the tailor's lips, as he sewed away, and occasionally venturing to express an opinion or even a contradiction."

"Then the debate would open, and might last for days or weeks, being postponed at irregular intervals according to the exigencies of the struggle for existence.. . . . It was there that the writer (Mr Watson) learned something about astronomy. The boot-seller had taken the matter up and, in his vast ignorance, crossed swords with the equally informed tailor."

"Books were procured, diagrams were drawn, even a tiny telescope was dug up from somewhere and peered through. Then Halley's Comet appeared above the club-house and stimulated further investigation. I listened with awe. . . . . but by and by I could see starlight and butted in. I started off by shifting the celestial pole both practically and theoretically - practically by accidentally kicking the leg of the telescope – theoretically by explaining to them the precession of the equinoxes, which I had discovered (in a book). After that I was admitted into full fellowship of the club."

"Mr Watson goes on to mention the dispersal of the 'club' owing to the 1914 War and other causes but the seeds were sown. Mr Watson himself stayed on in Beaufort West where he achieved world fame as the sole discoverer of a new star, Nova Pictoris, in May 1925. He was setting out for early duty at 5.45 a.m. and looked round the sky as usual. Then he noticed a pair of stars which he did not remember having seen in that part of the sky before. He says that he longed to go back home and consult his star atlas, but the thought of the colleague whom he was relieving at 6 a.m. deterred him. However, at breakfast time he hurried home and looked up his chart and found that one of the pair was a new star. He hastened to wire to the Royal 0bservatory, and thus notice was given to the world of one of the most remarkable of these new stars of modern times. The information was published everywhere and "Professor Watson of the Beaufort West Observatory" as one overseas paper called him, earned a distinguished place among South African amateur astronomers. The new star in question, however the great outburst of light was caused, has not yet, after over twenty years, declined to its original brightness or faded out altogether, and Watson's star remains one of the remarkable objects of the Southern Hemisphere.

"The Beaufort West Philosophical Club, either at its disruption or earlier, led I feel sure to the foundation of the Cape Astronomical Association (later the Astronomical Society of South Africa)." ☆

# Zeekoegat Observatory – A Nostalgic Journey

Errol Swanepoel (*errol.swanepoel@gmail.com*)

During the years 1963 to 1964 my father was employed as a welder for the construction company which built part of the N12 road from Beaufort West to Klaarstroom. The workshops and living quarters were located about 1 km from the quaint little outpost of Zeekoegat (also spelled *Seekoeigat*).

The first thing that caught my attention as a 10-year-old boy when we got there was a white rounded building I saw in the distance. My parents informed me that it was a “sterrewag” (observatory) and I was intrigued. I wanted to know what it was and the best explanation they could offer was: “there is a big, big telescope inside”!

One day, while buying provisions at the shop in Zeekoegat, we ran into a very good friend whom my parents knew from our home town of Aberdeen (South Africa). He was a black man, and as luck would have it, he worked for the French scientists at the Observatory. I am not sure what his role was, but more than likely he was just a helping hand. As a favour, he collected the stamps for me from all the mail they received from France (and quite a lot from Ghana).

Having someone on the inside soon presented us with an opportunity to visit the “sacred place”. Unfortunately the French guys had to go into town at the last minute for reasons I cannot recall, but our black friend showed us around. I could not keep my eyes off the mighty telescope and just wanted to “look through it”. Our friend was however not permitted to operate the telescope or the other equipment. Instead he showed us many of the photographs that

The “Sacred Place” - The ‘Abri’ housing of the Marseilles GPO. Source: ASSA Archives.

were taken. To this 10-year-old boy that was not very interesting or what I expected at all! There were just little dots on the black-and-white plates which did not make any sense. All these exciting looking stuff (equipment) and the photos were not even in colour, I thought!

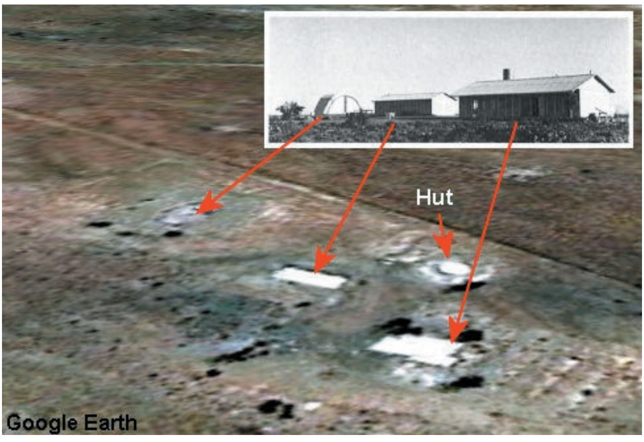
Now almost 50 years later, I started wondering what ever happened to the observatory at Zeekoegat. Taking a chance I sent Mr Wilie Koorts of the SAAO an SMS asking him if he could shed some light on the subject. He informed me that this was one of the test sites for the European Southern Observatory (ESO). Armed with this knowledge I did a better search on the Internet and found some more information.

The most informative article I found was article 11 published in the *ESO Messenger* nr. 55 of March 1989, titled "ESO's Early History, 1953-1975 - Searching for a Site in South Africa" by A Blaauw.

I looked up the observatory's position on a survey map of the time and had a look on Google Earth to see if anything visible remained. See the photo (taken from the ESO Messenger article) to Google Earth projection.

Apart from the site testing that was carried out at Zeekoegat, it was decided to add some "Real" astronomy. Zeekoegat saw the erection of the so-called GPO (Grand Prism Objectif) telescope, a 40 cm objective-prism refractor, for determining radial velocities. So this was the monster I saw in the "sacred place"!

Bad "seeing" conditions, closely related to the decrease of temperature in the course of the night and off-course the political climate, saw ESO established at La Silla in Chile. The article concludes with this sad comment: "The rather sudden switch from South Africa to Chile did not pass without bewilderment to the young astronomers and their collaborators still at work in South Africa. Had years of effort been wasted? Some disappointment was undeniable." ☆




**A historic picture of the Zeekoegat Observatory (insert) projected onto a modern Google Earth satellite image.**

# ESO Site Testing in South Africa

Willie Koorts

## Introduction

The European Southern Observatory (ESO) celebrates 50 years this year. Quoting from their website: "It all began in 1962 [on 5 October] with the signing of the ESO Convention — the culmination of the dream of leading astronomers from five European countries, Belgium, France, Germany, the Netherlands and Sweden." However, seven years of history, all involving South Africa, were excluded from this celebration.

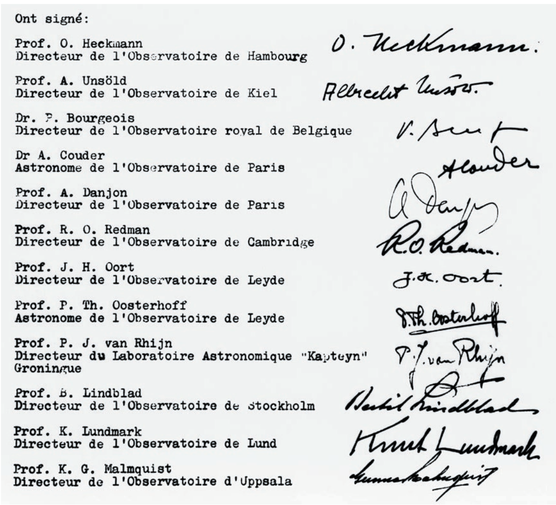
When Errol Swanepoel first contacted me, enquiring about the activities at Zeekoegat near Prince Albert in the Karoo (see article on p.246), all I could tell him was that it was related to site testing done by ESO in the 1950s, before they eventually decided on South America. My main source of information was a paragraph from Moore and Collins (1977), stating that in 1955 five European countries set up two "pilot" observatories; one manned by the French at Zeekoegat and one by the Germans in the Nieuwveld Mountains near Beaufort West. The book continued by saying that the German station soon closed down whereas Zeekoegat continued for longer. The activities were supposedly no more than site testing. Moore and Collins concluded that South Africa was abandoned for reasons mainly unconnected with science, i.e. political ones.

As Errol indicated in his article, Adriaan Blaauw's historical series in *The Messenger* on the founding of ESO is a great source of information (Blaauw 1988, 1989-1, 1989-2). I subsequently studied it with interest and set off on a "virtual tour", using Google Earth, trying to find their observing sites and looking for any remaining evidence. I also scrutinised the SAAO archives which contains some information on this venture, in particular the early days while the British were still part of the original ESO setup.

Blaauw (1988, 1989-1, 1989-2) contradicts Moore and Collins (1977), revealing that Zeekoegat became more than just a test site, but an actual working observatory, and that La Silla turned out to be a superior site, hence the final choice. It also became apparent that an immense amount of effort, lasting more than seven years, covering huge parts of South Africa, was spent before the final decision was made. And that the final decision had been quite a rapid one.

Regarding the influence of politics on the outcome, Blaauw (1989-2) wrote as follows: "Political concern, although undeniable over the years of ESO's activities in South Africa, never became the dominant element in the considerations with regard to the choice of the site; the decision eventually made was a clear-cut one, based on the superiority of the South American findings."

Fig. 1: The effective beginning of ESO, when on 21 June 1953, during a conference at Leiden Observatory, a group of astronomers discussed the idea of a joint European effort in astronomy. From left to right: V Kourganoff (France), JH Oort (Netherlands) and H Spencer (Great Britain). Credit: ESO, A Blaauw



Ont signé:

Prof. O. Heckmann
Directeur de l'Observatoire de Hambourg

Prof. A. Unsöld
Directeur de l'Observatoire de Kiel

Dr. P. Bourgeois
Directeur de l'Observatoire royal de Belgique

Dr A. Couder
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Prof. A. Danjon
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Prof. R. O. Redman
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Prof. J. H. Oort
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Directeur de l'Observatoire d'Uppsala

Fig. 2: On 26 January 1954, astronomers from six European countries gathered in the stately Senate Room of Leiden University for a discussion of the recently suggested Joint European Observatory. Under the chairmanship of Bertil Lindblad of Saltsjobaden they formulated and duly signed this historic statement, meant to strengthen their efforts for government support in the respective countries. Credit: ESO

## The initial JESO concept

It is interesting that the idea of a joint European effort for a southern observatory came from an American-based astronomer whose roots were in Europe. Walter Baade of the Mount Wilson and Palomar Observatories suggested the idea to Jan Oort while spending two months at Leiden Observatory in the spring of 1953. Oort was very keen on the idea and acted swiftly, arranging a discussion meeting the day before the Groningen conference later that year (Fig.1). This was followed up six months later with a watershed meeting, held on 26 January 1954, where twelve leading astronomers from six European countries issued the historical statement which set the scene for what would become the European Southern Observatory (Fig.2). Until October 1956, the original name of JESO (Joint European Southern Observatory) was used. The countries represented were Belgium, France, West Germany, Sweden, the Netherlands and Great Britain. The latter officially withdrew in October 1956 to pursue the idea of a Commonwealth telescope in Australia. (Fig.3)

Also interesting is that, from the onset, South Africa was regarded as the default location – no other country was even considered or discussed. South Africa seemed the obvious choice since, at the time several European countries had facilities here. Examples of these were Harvard Observatory's Boyden Station near Bloemfontein and Leiden Observatory's southern station, first at the Union Observatory in Johannesburg and later at a field station near the Hartebeespoort dam. British astronomy of course had long and close relations with South Africa through the Royal Observatory in Cape Town and the Radcliffe Observatory at Pretoria. Rather than enlarging these existing observatories, the idea was to pool efforts and resources into one large facility. South Africa was the obvious location because it had the best astronomical climate known at the time.

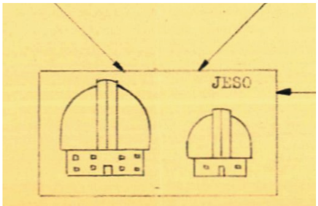



**Fig. 3: This sketch was part of an early organogram, showing the original name of JESO (Joint European Southern Observatory). Source: SAAO Archives.**

## Site options

The newly formed JESO Committee wasted no time and the main agenda item at their next meeting, held in November 1954 in Paris, was to plan site testing in South Africa. They observed that, at the time, all the major observatories in South Africa were located near cities (the Royal Observatory near Cape Town, the Union Observatory near Johannesburg, the Radcliffe near Pretoria and the Lamont-Hussey and Boyden at Bloemfontein). Even though light pollution was not yet regarded as such a threat, the vicinity of a major centre of civilisation was not deemed an important criterion. Weather patterns were studied, but the awareness that an astronomical observatory must also have good seeing was already well understood at the time, though site testing techniques were still very rudimentary. Even though observatories had been operating for many years in South Africa, there was surprisingly little seeing information available for study. Of interest was a 1953 report by BJ Bok where he compared seeing conditions at Boyden to an observing station in Massachusetts. In this Bok pointed out a trend that, all over the High Veld, the seeing tended to deteriorate after midnight with no recovery by dawn. This behaviour was also reported at the Union and Radcliffe Observatories on the reef as well as the Lamont-Hussey in Bloemfontein. (Blaauw, A, 1989-1)

Meteorological data suggested that the Highveld should present the most favourable over-all conditions. It was therefore decided to first explore the Pretoria-Johannesburg and Bloemfontein-Kimberley areas with limited tests in the Beaufort West region further south. At the first two areas, a fixed observatory served as a reference and its results were compared to those from a movable telescope. In these comparative seeing tests the Radcliffe Observatory in Pretoria and the Boyden near Bloemfontein played major roles. The Royal Observatory in the Cape was similarly involved, although not as much, being situated in a different climatic zone.

Initially the sites explored were just slightly elevated from the surrounding terrain. Towards the end, the "mountain-top" concept (following the Californian experience) was also explored. Thus two different philosophies were looked into.

**Seeing testing options**

A decision that had to be made was on the exact manner in which the seeing should be tested. At the time, three methods were common practice:

**1) Diffraction ring appearance,** where the observer judged the seeing by the appearance and quality of the diffraction rings of highly magnified stellar images, using a small reflecting telescope. A disadvantage of this method was that it was difficult to place a quantitative value on the seeing. This method therefore relied on a mutually agreed scale of ratings which needed to be cross-checked regularly between observers.

**2) Image motion**, where the observer judged the seeing by the degree of movement of the bright central spot of a stellar image. This method allowed a quantitative measurement, for instance the average deviation of the central spot from its mean position. It had the disadvantage of requiring a very stable mount and an accurate telescope drive. However, there were ways around this, like superimposing the views from two adjacent telescopes.

**3) Turbulent cells** in the atmosphere could be measured directly by means of very fine temperature measurements at a fixed point above ground level (for instance on the top of a long fixed pole). The rapid temperature fluctuations caused by the successive passages of turbulent cells were found to correlate closely with changes in seeing.

The classical method of diffraction ring appearance (method 1) was selected for site testing in South Africa. Four azimuthally mounted reflectors of 250mm aperture were specially built for the project at the Paris Observatory. These were referred

**Fig. 4: A typical ESO site testing station in 1961. On the right is the 25-cm Danjou-telescope, used to measure the seeing, while the little photometer on the left is monitoring the transparency of the atmosphere. Credit: ESO, W Schlosser**

to as "Danjon telescopes" and were based on the design and method described by Danjon and Couder in their 1935 text-book *Lunettes et Télescopes* (Fig.4). (Telescope makers may recognise influences of Jean Texereau in the design. It was therefore not too surprising to see his name in the correspondence regarding the telescope design.) In addition, atmospheric extinction measurements were required for which photo-electric observations at 4500 and 5300 Å were made, using small refractors (Fig.5).

**Fig. 5: This picture shows the observing post on the Rooiberg hill near Cillitzdorp in the southern Karroo, with a Danjon telescope equipped with a Walraven refractor-photometer. The car is one of the two Ford Range Wagons used by the parties. The picture was taken by one of the principal participants of these site tests, J Dommanget. Credit: ESO, J Dommanget**

Towards the end of the project, temperature measurements of turbulent cells (method 3) were employed as an alternative method of site validation.

Short runs of image motion measurements (method 2) were also made at the end of the campaign for comparison with site testing undertaken by the Americans in Chile using their favoured method.

Throughout each night of the site-testing campaign four types of observations were undertaken:

1. Visual measurements of turbulence (diffraction rings and chromatic scintillation).
2. Photoelectric extinction measurements (made with long time constants).
3. Photoelectric scintillation measurements.
4. Daily meteorological observations. (ESO Committee, 1956)

**The site testing campaign**

The map in Fig.6 gives an overview of the huge effort put into testing different sites throughout South Africa during the campaign which lasted from December 1955 to mid-1963, a period of almost eight years. The first, truly representative European party of four young astronomers, from France, Belgium, West Germany and the Netherlands left Holland in October 1955 by boat. Quite fittingly, they travelled on board the *Zuiderkruis* (Southern Cross), the constellation still prominent in the ESO logo today. On their arrival in Cape Town on 6 November 1955, the party was

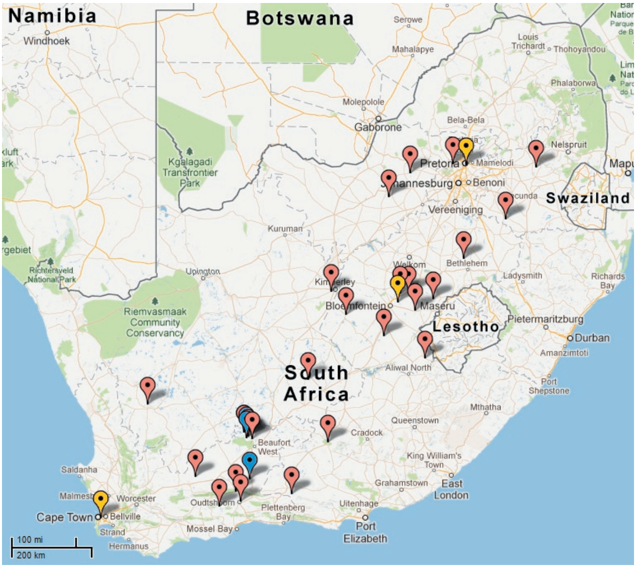



**Fig. 6: A map of South Africa marked with the positions of all the testing stations available from the documentation in the SAAO archives. The three yellow pins indicate the existing observatories used for comparison. The blue pins marked the sites that were found to be the best. Source: www.aardvarkmap.net/map/DTSPMO8A where you will be able to browse, zoom and pan into this map.**

met by Dr Stoy from the Cape Observatory who had already arranged for them the purchase of two Ford Range Wagons. They wasted no time in getting set up and made their first observations for intercomparing the observers in the Bloemfontein area in December 1955.

Initially the site testing was concentrated on the northern parts of the country. The work was divided into two regions; a northern area covering Johannesburg-Pretoria and a central one, around Bloemfontein. The northern region used the Radcliffe Observatory for comparison and included places such as the Hartebeestpoortdam, Belfast, Koster, Doringbult and Standerton. The Bloemfontein area, with Boyden as its reference, involved Kimberley, Bethlehem, Verkeerdevlei, Clocolan, Tabanchu, Koffiefontein, Edenburg, Zastron and De Aar. (Danjon 1956)

In April 1956 it was decided to drop the Pretoria area and to concentrate on the Free State and expand further southward down to the Oudshoorn region. As testing progressed, the Karoo started emerging more and more as the most promising region, so it was decided to extend testing to there. In particular, around Zeekoegat (near Prince Albert), which is on a low plateau at 1 000 m elevation, amongst the foothills of the Swartberg mountain range. This search covered the Graaff-Reinet and Beaufort West areas as well as the towns of Calvinia (Hantamsberg area), Laingsburg, Willomore, Calitzdorp (Rooiberg area) and included the Swartberg Pass itself. (Boulon et al, 1956)

In February 1957 it was decided to discontinue photoelectric observations until further notice. This was partly because the

**Fig. 9: The farm Klawervlei in 1959 against the backdrop of Table Mountain, one of their principal test sites. While testing in the area, they stayed in one of the buildings on the farm. Credit ESO, A Blaauw**

**Fig. 8: (left) The other temporary observatory on Rockdale Mountain housed a telescope for measuring photometric extinction. From left to right are B van Geelen, H Lindén and André Muller. Source: Blaauw (1991)**

results thus far indicated that the extinction in all possible parts of South Africa was fairly close to the expected limit and that variations from place to place were without significance in the choice of possible sites for an observatory. (ESO Seeing Expedition, 1957) It was later resumed during the final comprehensive campaign (Fig.8).

Zeekoegat began to emerge as the superior site by September 1957, with Tafelkopje, a hill near Bloemfontein, a close second. By doing simultaneous testing from Boyden hill, comparing it to measurements taken at different heights up Tafelkopje (which is slightly higher than Boyden), the dreaded inversion layer phenomenon that increased as the night wore on, as reported by Bok, could be verified. (ESO Report, 1957)

**The Karoo is the best**

By May 1959 it was decided to stop all testing around the Bloemfontein area and to concentrate on Zeekoegat, but attention was also to be given to sites at considerably higher elevations than those explored so far. Such sites were to be found on the Nieuwveld plateau, north-west of Beaufort West. Here three mountain spots on the farm Klawervlei were identified, namely Table Mountain (1 970 m), Rockdale Mountain (1 860 m) and Flathill (1 490 m), which became the subject of intensive tests (Fig.9).

All the sites tested thus far could be reached by existing roads – they would often just set up a station in a clearing next to the road (Fig.10). The Klawervlei mountain sites however required road construction. Through an intermediary of the owner, R Köster, by September 1959, four-wheel-drive access to Table Mountain became possible after the construction of 11 km road. A three-month "quick look" expedition revealed that the seeing on Table Mountain was sufficiently encouraging to warrant more thorough testing. The two other Klawervlei sites (Rockdale and Flathill)

Fig. 10: (left) This picture was taken by one of the principal participants of these site tests, J Dommanget, and shows his collaborator J Boulon, at Willomore, with the equipment as it was moved in Ford Range Wagon between different observing sites. Credit: ESO, J Dommanget

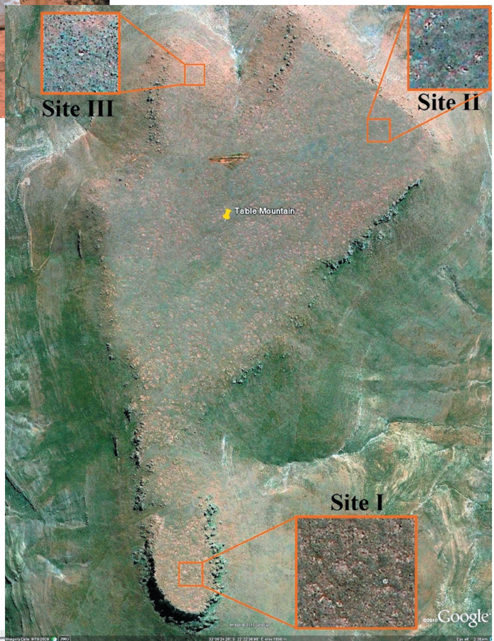



Fig. 12: (above) A Google Earth image of Table Mountain shows the resemblance to the insert map of Fig. 11. Remarkably, the 4x4 trails are still clearly visible after 50 years as well as evidence of the site testing, particularly Site I where they spent more time where the round rondavel foundation seems visible. Credit: Google Earth

Fig. 11: (below) A map detailing the test sites around Beaufort West marked with crosses, with Zeekoegat towards the south and the three Klawervlei sites NW on the Nieuwveld plateau. The blow-up of Table Mountain shows the three sites investigated by the "quick look" expedition in early 1961 as well as the route taken by the access roads. Credit: Blaauw 1989-1

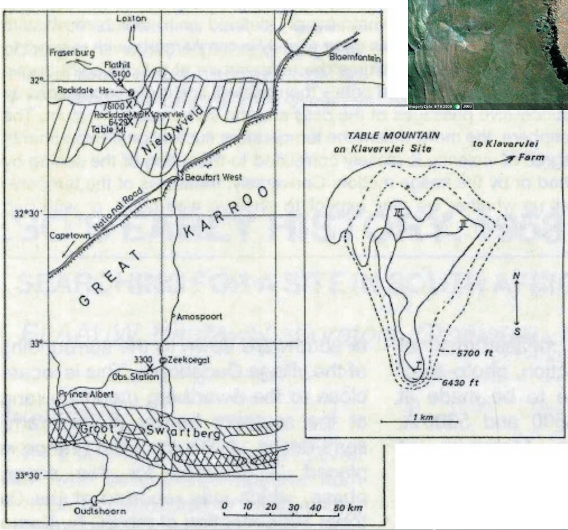
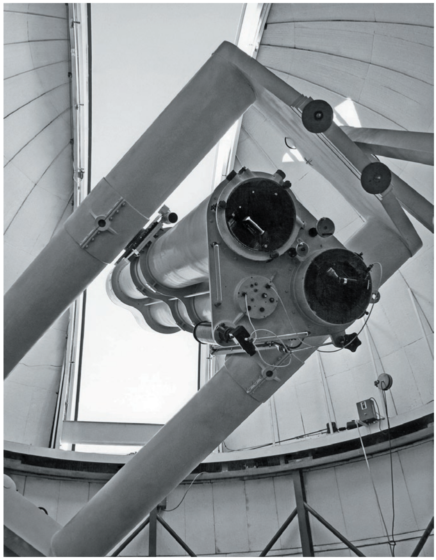


Fig. 13: **Ample use was made of "rondavel"-type of temporary buildings which could easily be erected and broken down again, particularly handy in the mountainous terrain of the Nieuwveld plateau. Credit: ESO, J Doornenbal**

**Fig. 14: (below) The GPO (Grand Prisme Objectif Telescope), here at La Silla in 1968, first operated in Zeekoegat, South Africa from 1961 to 1966. The GPO is a copy of a telescope installed at the Observatoire de Haute Provence in France. One half of the telescope is a 40-centimetre objective prism for obtaining the spectra of many objects at the same time. The other telescope is for guiding. Credit: ESO**



offered somewhat different characteristics, also worth exploring. Of the three sites on Table Mountain, only the southern one (Site 1 in Figs. 11 & 12) was to be kept. As testing progressed, Flathill seemed to emerge as the most favourable Klawervlei site. As the other two were about equal in quality it was eventually decided to lower the priority on Rockdale Mountain.

**Final comprehensive and focussed programme**

With site testing efforts now converging on four possible sites (Zeekoegat, Table Mountain, Rockdale and Flathill) in 1961 a final comprehensive programme was launched, covering a full year. This was in fact only concluded in 1963 as it eventually involved more than just site testing, but also "real astronomy" as well as some miscellaneous experiments.

As early as July 1958, suggestions were made to site a southern equivalent of the **Marseilles GPO** (Grand Prism Objectif) telescope in South Africa. This was a 40 cm aperture objective prism refractor for determining radial velocities, directed by Ch. Fehrenbach of the Marseilles Observatory in France. It was a duplicate of a similar telescope installed in the Haute-Provence Observatory (HPO), consisting of a photographic and a visual tube, each of 4 metre focal length (Fig. 14). The French

**Fig. 15: The Zeekoevlei site was dominated by the cylindrical domed building of the Objective Prism Astrograph with the rest of buildings consisting of housing and an office. Credit: ESO 1965 Annual Report**

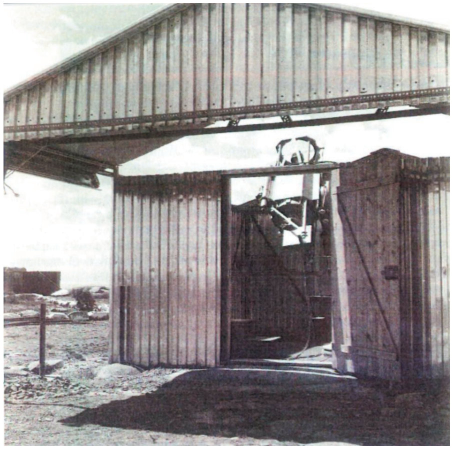


**Fig. 16: (right) The 40-cm Tübingen telescope, seen here in its temporary roll-off-roff observatory on Rockdale Mountain, was used for stellar photometry as well as integrated light from the Milky Way. Source: Blaauw (1991).**

authorities seemed to be rather uninterested in the whole campaign, so the GPO project was seen as a good opportunity to promote French interest in ESO. It was decided to site the GPO at Zeekoegat (Fig. 15). Construction started in 1958 and it became fully operational by the middle of 1961. This project eventually ran until 1966 (long after ESO "abandoned" South Africa) and was then relocated to La Silla where it was eventually decommissioned in 1996.

Rockdale mountain was selected as the site for the **Tübingen Photometric Project** which ran from August 1961 to November 1962. This consisted of a 40-cm telescope fitted with a three-colour photometer (Fig. 16). Apart from stellar work, it also did surface photometry of the Milky Way and of the Zodiacal Light in blue and red. These observations would become part of the data later used by the site-selection committee.

With the writing on the wall by March 1963, the emphasis of the work shifted towards inter-comparisons between the Danjon telescope and the American **double-beam telemeter** tests in the Andes. This was a special instrument with two objectives about 2 m apart, that formed two images of the same star in a common eyepiece. The relative motion between the two images was a measure of the seeing conditions in a telescope of large aperture (Voigt 1963). For comparison, a telemeter was shipped to South Africa. Likewise, a Danjon telescope was sent to South America. Danjon tel-

**Fig. 17: One of the Danjon telescopes, taken in 1962 during the last stages of site testing, here fitted with a mask to simulate a double beam telescope for measuring image motion. Credit ESO, D Beintema**

escopes were also modified with a mask over their apertures to do double-beam measurements (Fig. 17).

As mentioned already, right at the end of the campaign (July to September 1963), tests of the newly developed **Siedentoph Experiment**, (turbulent cell seeing measurements) were run at both Zeekoegat and Flathill. This used measurements of the rapid temperature fluctuations which accompany the turbulence in the atmosphere, which in turn, can be correlated with image quality. By mounting thermocouples and resistance thermometers at different heights on a tall mast, the dependence of turbulence on height was studied. These experiments played an important role in the decisions taken later with respect to the levels at which the telescopes in South America were to be mounted.

**More than just astronomers**

Although the bulk of the work was done by astronomers, non-astronomers also played a part. Ample use was made of locals to help gather meteorological data. Fig. 18 gives an idea of how diverse this group actually was. (ESO Seeing Expedition, 1956)

The final comprehensive programme of site testing required some extra staff. The type of person required was someone prepared to spend extended periods at isolated places, living under primitive conditions, capable of elementary cooking, handy in technical matters, and possessing the gifts for improvisation and readiness to perform over extended periods of routine work. It was realised that this description fitted an ambitious boy-scout exactly. Recruitment was thus directed at a Dutch journal for boy-scout leaders, with very rewarding results. Two such successful applicants later became permanent ESO employees (Fig. 19).

| | | | |
|---|---|---|---|
| Lainsburg | by Mr. Wolfaardt | (Met Observer) | Boyden Observatory (Mr. Bester) |
| Calitzdorp | Mr. Malherbe | (High School Principal) | Jacobsdal (The Engineer) |
| Prince Albert | Mr. Rossouw | (Student) | Clocolan (Dr. Geerthsen) |
| Beaufort West | Mr. Wilmot | (Rainfall Met Observer) | |
| Willowmore | Mr. Coetzel | (Town Clerk) | |
| Klaarstroom | Mr. Marincowitz | (Farmer) | |
| Oudtshoorn | Convent | | |

**Fig. 18: This list from the minutes of a meeting held at the Cape Observatory in November 1956, shows how diverse the group of meteorological observers were. Credit: SAAO Archives**

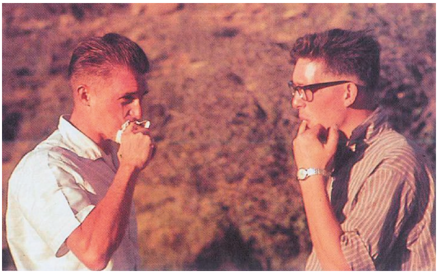


Fig. 19: Jan Doornenbal (left) and Bert Bosker went from Boy Scout leaders in the Netherlands, to ESO site testers in South Africa to ESO employees in South America. Credit ESO, D Beintema

These Europeans visiting and working in South Africa returned with lasting impressions of the beauty of the country and the hospitability of its people. As can be expected, life in South Africa had its lighter moments as well. A local trend started to emerge where the standard of living at these remote outstations got measured by the number of donkeys at each one! So much so that an "edict" had to be issued from Europe to limit the proliferation of donkeys (Fig. 20)! (Fehrenbach 1981)

## South Africa vs. South America

News of the promising results of American tests in the Andes reached European astronomers, first bit-by-bit, then more impressively. The reaction in the May 1959 meeting still read: "This will have very little influence on the development of ESO." But interest started growing soon after and by June 1961 it was planned to send a Danjon telescope and observer to Chile. By November 1961 it was decided to participate in the American site testing campaign and that one or more ESO committee member would visit South America.

It soon became clear that conditions in Chile were superior to South Africa in a number of respects. Statistics for cloudiness showed that the number of clear nights on Cerro Tololo was about 40% higher than in the Zeekoegat – Beaufort West area. The temperature fluctuations during a night in Chile were generally very small, compared to South African sites – such lower temperature fluctuations normally resulted in better seeing. No satisfactory direct comparison of the seeing between South Africa and Chile was possible because of the different methods employed in measur-


Fig. 20: The entrance gate to the Zeekoegat station in 1962, showing some of the infamous donkeys in the foreground and the observatory buildings in the background. Credit ESO, D Beintema

ing it. It was however possible to show that the seeing conditions were superior in Chile. Extinction results between the two countries were very comparable. The average wind velocity on Tololo was higher that at Zeekoegat, but lower than on Rockdale Mountain (Fehrenbach et al, 1963).

The decision to favour South America for hosting ESO came rather suddenly, taken during the committee meeting of 15 November 1963. To add insult to injury, the final South African site testing report was only published in 1967!

**Bewilderment and Consent**

Quoting from Blaauw (1989-2): "The rather sudden switch from South Africa to Chile did not pass without bewilderment to the young astronomers and their collaborators still at work in South Africa. Had years of effort been wasted? Some disappointment was undeniable. Disappointment would soon make room to the conviction that the decision had been right."

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# Astronomical Colloquia

These form an important part of a research facility, often as a sort of pre-publication discussion or a discussion of an individual's current research, and as such it is virtually impossible to "publish" this material. However by recording the topics discussed in the form below does indicate to those, who are unable to attend, what current trends are and who has visited to do research: it keeps everyone 'in the loop' so to speak

Also included in this section are the colloquia/seminars at the SAAO, NASSP, UWC and the Astrophysics, Cosmology and Gravity Centre at UCT, ACGC. Also included are the SAAO Astro-coffees which are 15-20min informal discussions on just about any topic including but not limited to: recent astro-ph papers, seminal/classic publications, education/outreach ideas and initiatives, preliminary results, student progress reports, conference/workshop feedback and skills-transfer.

*Editor*

**SAAO**

**Title: H2 Line-Cooling as a Beacon of Active Transformation within Compact Groups**
Speaker: Michelle Cluver (AAO)
Date: 25 October 2012
Time: 11:00
Venue: SAAO Auditorium
Abstract: Stephan's Quintet (SQ) is a Hickson Compact Group (HCG) experiencing a group-wide shock due to the high velocity collision of an intruder galaxy with the intragroup medium. We find in SQ abundant excited molecular hydrogen, efficiently dominating the cooling of this system. But is SQ unusual or just at the extreme end of HCG behaviour? HCGs are strongly interacting and show a distinctive gap in mid-infrared colour-colour space, suggesting rapid evolution from late types with copious star formation, to early-type systems dominated by S0's) with little star forming activity. I will present results from a Spitzer spectroscopy study of a sample of 23 HCGs where we observe enhanced H2 emission in galaxies lying at intermediate mid-IR colour (and specific star formation) with "green valley" optical colours. We propose that interactions with previously stripped material may be accelerating the transition from actively star forming to passively evolving systems dominated by an old stellar population.

**Title: HST Observations of Globular Clusters and Metal-Poor Stars**
Speaker: Prof BC Chaboyer (Dartmouth, Scientific Editor - The Astrophysical Journal)
Venue: SAAO Auditorium
Date: 12 November 2012
Time: 12:00
Abstract: Results from two large HST programs on globular clusters and metal-poor stars will be discussed. The ACS Survey of Galactic Globular Clusters obtained deep, uniform photometry of the

central 3 arcminutes of 65 galactic globular clusters. I will highlight some important results from this survey, including the discovery of multiple stellar populations in some globular clusters, constraints on the three-dimensional orientation of the Sagittarius dwarf galaxy and the relative ages of the 65 clusters. Initial results from an on-going HST program which uses the fine guidance sensors to obtain accurate parallaxes of metal-poor ([Fe/H] < -1.5) main sequence field stars will also be presented. These stars are used to test stellar evolution models and as standard candles to determine distances to metal-poor globular clusters.

**Title: Modelling the Variability of Luminous Red Giant Stars**
Speaker: Peter Wood
Venue: 1896 Building
Date: 7 November 2012
Time: 11:00
Abstract: The luminous red giant stars on the AGB and tip of the RGB vary with amplitudes that can be detected with ground-based telescope. Long-term photometric monitoring by microlensing experiments such as MACHO and OGLE has provided data which shows that the luminous red giants fall on approximately twelve period-luminosity (PL) sequences of different origin. Nine of these sequences are almost certainly of pulsation origin. I will discuss the nature of these sequences and the latest attempts to model them. One of the PL sequences consists of close binary systems containing a red giant. I will show how modelling this population can give a reliable estimate of the formation rate of planetary nebulae, binary and single. The other two sequences consist of red giants with long secondary periods. I wish I could model them, but I haven't a clue where to start!

**Title: Studying the Blue Sky at Night - SAAO's Potential Contribution to Solar Energy Research**
Speaker: Hartmut Winkler
Venue: 1896 Building
Date: 8 November 2012
Time: 11:00
Abstract: Astronomical data from Sutherland constitutes possibly the best calibrated set of measurements of the interplay between extra-terrestrial light and the Earth's atmosphere over southern Africa. Thousands of readings of standard star brightness and adjacent background sky illuminance have been collected over the decades, enabling one, in theory at least, to develop a detailed sky brightness profile as a function of wavelength, zenith angle, lunar phase and position, and atmospheric conditions. The presenter will describe preliminary results of a multi-filter photometric 20-inch observing run that aimed to systematically measure the brightness profile of the sky dome in the presence of the Moon. This profile is analysed in terms of light scattering theory, and its applicability to the estimation of the daytime sky dome profile is assessed. The talk concludes by exploring the significance of the data, as well as SAAO archival data, for photovoltaic solar energy installations, which will scheduled to be

erected on a massive scale in the Northern Cape over the years to come.

**Title: Proposing an “i-band Wide-field Camera” for the SAAO 0.75-m Telescope**
Speaker: Shuji Sato (Nagoya University)
Venue: SAAO Auditorium
Date: 22 November 2012
Time: 11:00
Abstract: We are planning a polarization survey project by developing a dedicated i-band (680~830nm) camera which covers ~1/2 degree square at one-shot and ~several degrees in one-night. We have finished the optical design for the camera (CCD pixel scale 15?m x4k format) on the SAAO 75cm telescope, so we will present two layouts of the cameras and telescope, lens system, and spot diagrammes; plan “A” and “B”. Plan “A” is to convert F15 to F5.5 with five lenses at around the Cassegrain focus, while Plan “B” to convert F3.5 to F5.5 with four lenses at around the primary focus. “A” shows the spot diagram of 8.2?m (~0.4”) at the worst RMS over the field of view, while “B” achieves 5.6?m(~0.3”) with distortions less than +-0.6% (<10”). This camera can be used for the r’-(620nm) and possibly for the g’-(480nm), as well as for the i’-band. From the viewpoint of the optical design and fabrication, “B” is more simple, feasible and economical, being preferable to “A”. However, “B” may interfere with the existing secondary mirror. We estimate the limiting magnitudes to be ~17 mag in i’ -bands with [SN~10] for 60 s integration for photometry with this camera on the telescope/F5.5. Last year, we obtained the limiting magnitudes g’~17.2, r’~17.1 and i’~16.5 mag for 60 s by using TRIPOL-1 on the SAAO 75cm/F15. For polarimetry, we expect the limiting to be ~15 mag with ?p < 0.3% for 60 s. We plan the schedule; 1) optical design will be fixed by the end of 2012, and 2) camera will be developed by the middle of 2013, then 3) we will install and test survey in the late of 2013. 4) Survey of dark clouds will be executed in 2014 and we will delineate magnetic field configurations in the peripheries of dark clouds.

**UCT**

**Title: Late-type distance indicators**
Speaker: Mr Marek Gorski, University of Warsaw
Venue: RW James Building Lecture Theatre C.
Date: 9 November 2012
Time: 13:00
Abstract: Why Local Group Galaxies are so important in terms of the Hubble constant, and how can we improve the cosmic distance scale? I will present some goals and results achieved by the project Araucaria - the main objective of which is to analyse and improve the cosmic distance scale indicators.

**ACGC**

**Title: Clusters of Galaxies: crossroads of Astro and Particle Physics**
Speaker: Prof Sergio Colafrancesco (SKA SARChI Chair)
Venue: RW James Lecture Theatre C

Date: 22 November 2012
Time: 12h30
Abstract: Galaxy clusters are the largest laboratories for Astro and Particle physics in the universe: they contain baryons (in diffuse gas and condensed, e.g. galaxy, forms), high-E and relativistic plasmas, cosmic rays, magnetic fields, Black Holes, Dark Matter. The study of their formation and evolution requires complementary information and synergies from both Astrophysics and Particle physics, and an approach that combines multi-disciplinary physics and multi-frequency observations. This is a challenging but scientifically rewarding task that will be able to return a vast amount of information on: the nature of Dark Matter, the origin of cosmic rays, the evolution of magnetic fields, the feedback of BHs and their jets. We discuss how this challenge can be tackled by using either a multi-experiment approach (i.e. combining observations obtainable from radio to gamma-ray observatories) or a single (multi-purpose) experimental technique.

**Title: Testing galaxy formation with gravitational lensing**
Speaker: Dr John McKean (ASTRON).
Venue: Lecture Theatre C, RW James Building, UCT
Date: 23 November 2012
Time: 12:00
Abstract: I will review some of the recent results that have been obtained on the mass structure of galaxies at intermediate redshift, as probed using strong gravitational lens systems. In particular, I will discuss how the observed mass slopes and the level of low-mass substructure within galaxy-scale dark matter haloes compares with the expectations from cold dark matter models for galaxy formation. Initial results suggest that the level of substructure observed in dark matter haloes is higher, with a flatter mass function, than to what is expected from simulations of galaxy formation.

**Title: Exascale computing in the Square Kilometre Array**
Speaker: Chris Broekma (Astron, NL).
Venue: LT303, 3rd Floor Computer Science Building (18 University Avenue), UCT
Date: Tue 11 December 2012
Time: 12:00
Abstract: The Square Kilometer Array (SKA) is an international project that aims to build a distributed radio telescope with a maximum baseline in the order of 3000 km, either in South Africa or Western Australia. Although the estimated processing requirements still vary wildly, these are clearly beyond the capabilities of even the most modern supercomputers. The first phase of the SKA, scheduled for first operations in 2018, requires anywhere from several to several hundred petaflop/s, while the full SKA, which we expect to build after 2020, is well on its way to require far in excess of an exaflop/s. Additionally, the I/O requirements run firmly into the scary range of several terabytes/s. It is clear that the SKA project is critically dependant on improvements in high-performance computing, and the ability of the project to efficiently leverage

these improvements. It is also obvious that the unique requirements of the SKA instrument mean that we cannot expect a tailored solution to just appear a few years from now. I will outline the SKA project and the experiences we've had building some of the pathfinder instruments. I'll also look at the processing requirements demanded by the SKA, how these match onto the projected developments in high-performance computing and where we can expect them to fall short.

**UWC**

**Title: Quasars and super-massive black holes**
Speaker: Dr Stephen Fine, UWC
Venue : Rm 135, Physics Department
Date: 2 November 1012
Time: 13:00
Abstract: Since the realisation that quasars are distant, highly-luminous objects accretion onto a super-massive black hole has been considered a likely power source. While the sphere of influence of the SMBHs is spatially unresolvable, studies of broad lines in quasar spectra appear to be able to measure the mass of SMBHs to within a factor of ~3. I will discuss how these estimators work and give some contrasting reasons to be both positive and negative about their potential. I will show some examples of how they have been applied to measure the SMBH mass function and to constrain semi-analytic models of galaxy evolution, and outline what further work is being carried out to improve quasar BH studies.

**Title: Evolution, Nucleosynthesis and Mass Loss in Low and Intermediate-Mass Stars**
Speaker: Peter Wood
Venue : Rm 135, Physics Department
Date: 9 November 1012
Time: 14:00
Abstract: Low and intermediate mass stars have initial masses less than about 8 MSUN. When they finally die, they leave a white dwarf star of about 0.6-1.0 MSUN: the remainder of their initial mass is ejected back into the interstellar medium. The ejected material is enriched in carbon, nitrogen and s-process elements as a result of nucleosynthesis in the stellar interior and dredge-up processes that bring the enriched material to the stellar surface. I will describe the various mixing, nucleosynthesis and mass loss processes that occur in low and intermediate mass stars, noting the large uncertainties that exist in modelling them.

**Astro-coffee**

**Title: Using Blending Effects: A Challenge to Study Super Star Clusters in a Sample of Extragalactic Systems at z>0.01**
Speaker: Zara Randriamanakoto
Venue: 1896 Building
Date: 17 October 2012
Time: 11:00
Abstract: For nearby extragalactic systems located at distances beyond ~40Mpc, the literature agrees that photometric biases are expected in a crowded-field of CCD imaging. However, little has been done so far to quantify the effects of blending.

In this talk, I will present our findings from a deeper investigation of the effects on the photometric analysis of super star clusters (SSC) in our sample. A simulation aimed to record any change in the values of the SSC luminosity function slopes has been performed as well as a photometric follow-up of SSC of a nearby system (~19Mpc) when it is moved to a larger distance.

**NASSP**

**Title: Exposing the hidden side of GAMA**
Speaker: Dr Michelle Cluver
Venue : RW James Lecture Hall D
Date: 17 October 1012
Time: 13:00
Abstract: The mid-infrared is key to disentangling the composition and dusty metabolism of a galaxy as it evolves. By harnessing the power of the Galaxy and Mass Assembly (GAMA) multiwavelength photometric and (optical) spectroscopic survey, combined with WISE (the Wide-field Infrared Survey Explorer), we can investigate key empirical relationships, in turn revealing the intrinsic physics of vast galaxy populations. This talk will focus on preliminary results from a detailed WISE study of the GAMA G15 field, as well as discuss other applications of GAMA and WISE science.

**Title: Activities and Opportunities in Space Science at the South African National Space Agency**
Speakers: Dr John Bosco Habarulema, Dr Jeanne de Villiers, Dr Elijah Oyeyemi and Ms Mpho Tshisaphungo from the South African National Space Agency (SANSA)
Venue : Duncan Elliot Rm., RW James Building
Date: 17 October 1012
Time: 12:00 - 13:00
Abstract: The South African National Space Agency (SANSA) was established under the SANSA Act, No. 36 of 2008, as a public entity with independent, impartial and objective decision-making authority to serve local and international stakeholders and coordinate the country's space-related initiatives. SANSA has four directorates: SANSA Space Science, Earth Observations, Space Operations and Space Engineering. SANSA became fully operational on 01 April 2011, and as a new public entity we have a responsibility to inform the South African people about the current and future activities of SANSA and encourage collaborations with SANSA. SANSA's presentation aims to expose the staff and students to the available SANSA facilities, postgraduate projects, and collaboration and job opportunities. In addition, we hope that this interaction will create an opportunity for staff and students to ask questions and receive information on SANSA and our plans for the advancement of Space Science and Technology in South Africa. We hope that this will result in active engagements in the form of collaborations (research in space science and student training) between SANSA Space Science and UCT. ☆

# Mythical Monoceros - Unicorn of the Skies

by Magda Streicher
*magdalena@mweb.co.za*

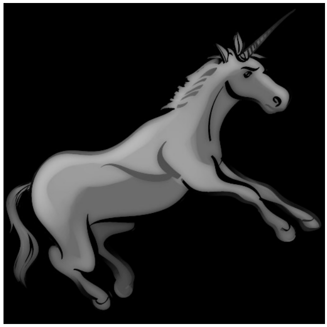


Image source: Stellarium.org

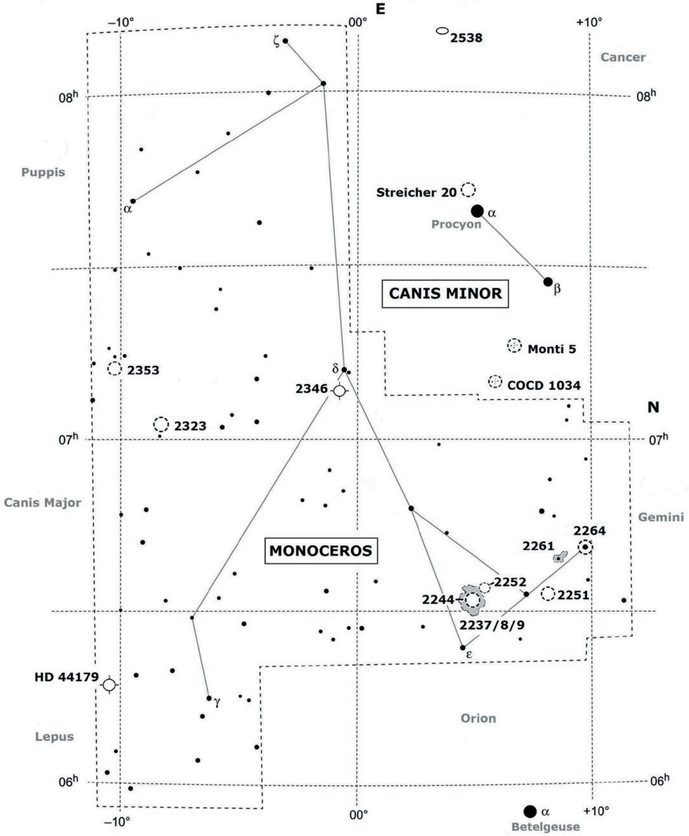
On the north-eastern edge of the well-known Orion constellation the Monoceros unicorn gallops on in the direction of Gemini the Twins. The constellation lacks stars brighter than magnitude 4, but is blessed with beautiful nebulae and star clusters. Various myths surround the reflection of the image, one of which is the misinterpretation of what we know today as the rhinoceros.

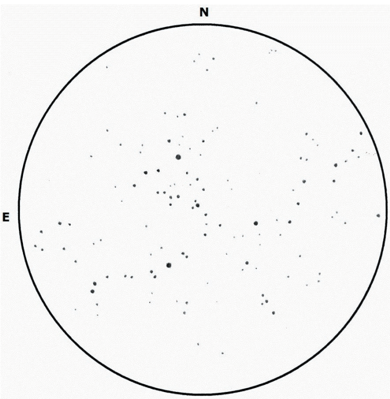
Sometimes Monoceros loses out as far as interest is concerned to its famous neighbours. Nonetheless, Monoceros is not insignificant, housing, as it does, few exceptional and interesting, frequently described objects.

Only a few arc minutes north of the boundary with Canis Major, approximately 3 000 light-years away, hangs the star cluster **NGC 2353** in the southern part of an area of soft nebulosity. What a lovely cluster of approximately two dozen varied-magnitude stars in a slightly elongated north-east to south-west elongated oval. A dark lane appears to divide the group into two parts: the northern section, with slightly brighter stars arranged in an arrow-like shape that brings to mind the typical traffic arrow indicating which way to go. Several fainter stars comprise the southern part; accompany a magnitude 5.9 shiny white colour star. A pair of magnitude 10 stars indicating the heart of the group.

However, the star cluster conceals a slight hitch. The star field is quite busy and the controversy involves the now listed NGC 2353 (H V111-34), discovered by William Herschel. William's son, John Herschel, never found NGC 2353 (H V111-34), which he most certainly would have in the same star field sweep. However, he did document NGC 2351 (h437), with a one degree error from his father William. There is strong evidence that the two objects NGC 2353 and NGC 2351 as described are one and the same.

One of Monoceros' famous objects is the open cluster **NGC 2323**, perhaps better known as Messier 50, which can be found easily with only the aid of binoculars. Located 3.5 degrees west of the above-mentioned NGC 2353, it is a large, bright cluster which could easily contain 80 stars or more (see sketch and photo). The grouping, in an elongated north-west to south-east direction, might resemble, perhaps, a bird in flight – or a housefly, to use the words of Sue French! The middle part is quite compressed, with several chains and stars in pairs that represent the indicated look. Two prominent strings spread out to the




NGC 2323 - Open Cluster - Monoceros

M50; the better known name for NGC 2323 or the Heart Cluster. Photo: D Liebneberg.

south-east and north-west, creating the impression of a bird's wings.

In the far west of the constellation the hind leg of the horse figure may be seen as represented by the star beta Monocerotis, also called Herschel's Wonder Star. What a lovely trio of blue-white suns in a tight, slender formation which leaves an impression to remember. The three stars, classed with a spectrum of B2, vary in magnitude: 4.7, 5.2 and 6.1 respectively.

An object widely discussed among amateurs is the **Red Rectangle Nebula**, about 4 degrees south and in a triangle with beta and gamma Monocerotis. The nebula adjoining the star HD 44179 is situated just one degree north of the boundary with Canis Major. The Red Rectangle ranks right up as one of the most difficult objects ever to discern – barely 30" north-east of the indicated star. What is fascinating is all the nicknames given to many of the objects in the starry skies that leaves one with thoughts of nostalgia and amazement, but oh dear, to try and discern that object as a faint little rectangle is nearly impossible. The Red Rectangle Nebula, so called because of its red color and unique rectangular shape, is a proto planetary nebula just known as only HD 44179. The nebula was discovered in 1973 during a rocket flight associated with the AFCRL Infrared Sky Survey called Hi Star. The binary system at the center of the nebula was first discovered by Robert Grant Aitken in 1915 (Wikipedia).

Perhaps the best known object and most certainly a very beautiful object is situated two degrees east of epsilon Monocerotis in the far western field of the constellation. **NGC 2237/8/9** in combination with others is known as the Rosette Nebula. It is a large, low surface brightness nebula covered with faint star dust, unfortunately be appreciated to its full only with slightly larger power than binoculars. This lovely ring of segmented areas is assigned with different NGC numbers, but it is advisable to use a nebular filter to bring out the various parts in full. The brightest part of the nebula is situated mostly in the northern part. The eastern inner wall of the nebula is much wider and fainter, with the cluster **NGC 2252** situated on its edge slightly north-east. This grouping is one of those rare types which in starlight tell a story without words. The irregular shape can be described as a fish-hook decoration in a north-south direction with the hook on the northern edge. But the crown of this beautiful, hazy rosette is the star cluster **NGC 2244**, which is enveloped within the superfine nebulosity. The tight grouping contains perhaps a few dozen very hot O-type stars of various magnitudes. The object as a whole is about 90 light-years distant and more than 25 light-years across. It is an outstanding, rich area in combination with flimsy pieces of nebulosity, faint stars dotted in and around to make this one of the most special objects to have been discovered. The name Rosette had achieved currency only in the early 1950s, but was fairly well known by 1955.

A further 3.5 degree north-east is **NGC 2251**, another story-quality cluster not to be missed. If you ever see a star formation resembling an eye, complete with eyelashes, and then this would be it! A knot of brighter stars represents the focus eye, occupying the spot inside a half-moon eyeball shape looking north-east. Star points flick out towards the north-west, just like a nice and curly eyelash. Small open clusters are a joy to observe and most of the time a starry story can be seen in their numerous shapes.

Another degree further north-east is the well-known and very special variable star R Monocerotis accompanies a fan-shaped nebula. Known as Hubble's Variable Nebula, or **NGC 2261**, it displays a reflecting comet-like nebula with R Monocerotis at the southern tip. Although faint and not so easy to discern, the western side of the nebula seems slightly brighter. It was named after the young Edwin Hubble in 1916, which discovered that the nebulosity around the young hot star R Monocerotis varied in brightness and shape. It is a classic reflection nebula with powerful stellar winds that produce the comet-like nebula we see today. Hubble's Variable Nebula was the first object photographed by the 200-inch Hale Telescope at Mt Palomar in 1949. I am totally convinced that a number of "backyard amateurs" excitedly believed they had discovered a new comet, only to be disappointed when they found out what it really was.

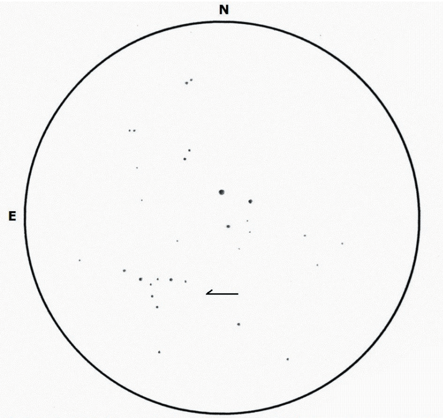
Less than 2 degrees from the boundary with Gemini, is another splendid object in an outstanding field of view nicknamed the Christmas Tree Cluster. To find it, locate 15-Monocerotis in the far northern part of the constellation and you'll be right in the midst of the triangle-shaped Christmas Tree Cluster, known as **NGC 2264**. This bright, large cluster, which spans more or less half a degree in a north-south direction, is easily seen through binoculars. Careful observation through a telescope, however, reveals about 20 stars embedded in flimsy nebulosity, which tapers down with brighter stars to the south, ending with the famous Cone Nebula, an obscure dust cloud which is extremely difficult to see. Higher magnification reveals a mist of Christmas decorations shining like glittering faint stars covering the tree in frosted nebulosity. NGC 2264 is more or less 20 light-years in diameter and approximately 3 000 light-years away.

The magnitude 4 delta Monocerotis can perhaps be seen as the rounding of the horse's back in the overall shape of the constellation. The planetary nebula **NGC 2346** is only 40' west from the star. The object is not that difficult to observe, despite being somewhat small in size. Averted vision causes a blinking effect, which is a good way to glimpse detail like the central star and the light-grey colour of the nebula. Higher magnification will reveal a hazy edge with a more obvious confirmation of the planetary nebula as a whole.

Seeing that the constellation Canis Minor is just further north-east and next door to Monoceros as seen against the star field, a few objects can be added to the mix.

Although Canis Minor is the smaller of Orion the Hunter's two dogs it boasts the brilliant beacon star Procyon, more or less in the middle area of the constellation and the eye of the dog figure. Its name means "Before the Dog", because it rises shortly before the Dog Star, Sirius, in the constellation Canis Major. The star alpha Canis Minoris (Procyon) is seen without any difficulty as the bright yellow-coloured magnitude 0.4 star. There is also a companion star, Procyon B, a magnitude 12.9 white dwarf first seen in 1896 with the 36-inch refractor at Lick Observatory. It had a separation of 5.2" and position angle of 26. Procyon B is about 10 magnitudes fainter than the primary, which makes it almost impossible to spot in the blinding glare of the primary star Procyon.

Barely a degree east from this famous star I found an asterism now known as

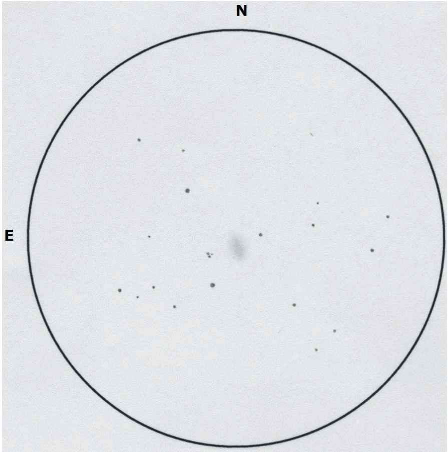



MAGDA - Asterism - Canis Minor - RA: 07h44m - DEC: +04o50'

**Streicher 20**, comprising a handful of magnitude 10 stars in a well-formed flat Y shape (see sketch). The open end of the letter Y faces north-east together with three prominently brighter stars that form a wide triangle in the same field of view.

On the western edge of this small constellation the so-called "Triple Trapezium" cluster can be found, and each of these three stars had two companion stars as well. Kharchenko, Piskunov and Roeser place most of the stars within the radius of their open cluster, **COCD 1034** = ASCC 34 = [KPR2005] 34 and list the position of the magnitude 8 star HD 54779 as the cluster's centre (Webb Society journal 144). The small faint triple trapezium is situated 6' towards the south-east of star HD 54779 relative towards the middle area of the cluster. However I found a relatively bright six pack, also known as **Monti 5** two degrees east of KPR 2005 1023 that seems to copy this trapezium quite well which is very strange and a rare coincidence. Monti 5 is a tight asterism of five stars quite bright and outstanding with the magnitude 8 star HD 56667 on the south-west corner. It is well worth the effort to search out this grouping.

To discuss several objects in an article is the norm, but they are not all favourably and easily observed. Galaxies are known to be rather faint most of the time. One such in Canis Minor is the galaxy **NGC 2538**, situated in the far eastern part of the constellation on the boundary with Hydra constellation. The object shows itself only in truly dark skies as a soft washed-out glow slightly elongated in north-east to south-west direction with a faint triple star just east (see sketch).



NGC 2538 - Galaxy - Canis Minor

Make the good little puppy dog your friend, dress warmly and get on the back of the starry Unicorn, stop on your way and drink from the ponds of delights it has to offer. ☆

| Object | Type | RA (J2000.0) | Dec | Mag. | Size |
|---|---|---|---|---|---|
| Red Rectangle HD 44179 | Reflecting Nebula | $06^h19^m8$ | -10°38 | 9 | 30” |
| NGC 2237/8/9 | Emission Nebula | 06 32 3 | +05 03 | 4.8 | 80’ |
| NGC 2244 | Open Cluster | 06 32 3 | +04 51 | 4.8 | 24’ |
| NGC 2251 | Open Cluster | 06 34 7 | +08 23 | 7.3 | 10’ |
| NGC 2252 | Open Cluster | 06 35 0 | +05 23 | 7.7 | 20’ |
| NGC 2261 | Reflecting Neb | 06 39 2 | +08 44 | 3.5 | 3’x2.5’ |
| NGC 2264 | Emission Nebula/ Open Cluster | 06 41 1 | +09 53 | 3.9 | 30’ |
| NGC 2323 | Open Cluster | 07 03 2 | -08 20 | 5.9 | 16’ |
| NGC 2346 | Planetary Nebula | 07 09 2 | -00 48 | 11.6 | 55” |
| COCD 1034 | Multiple Star group | 07 10 5 | +06 04 | 8 | 36’ |
| NGC 2353 | Open Cluster | 07 14 6 | -10 18 | 7.1 | 18’ |
| Monti 5 | Asterism | 07 18 4 | +06 18 | 8.5 | 3.3’ |
| Streicher 20 | Asterism | 07 43 7 | +04 50 | 9 | |
| NGC 2538 | Galaxy | 08 11 4 | +03 37 | 12.2 | 1.6’x1.2’ |

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