



# C.M.O.S. NEWSLETTER

OCTOBER 1978

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## PRESIDENT'S COMMENTS

The announcement in mid-August by Mr. Andras, President of the Treasury Board, of the pending early closure of Ocean Weather Station PAPA, by 31 March 1979, came as a shock to many members. That the announcement was premature was apparent to a committee of our Society, which was struck during Congress, to formulate a Society policy on the eventual potential closure of Station PAPA. The committee drafted a letter to be sent to the Prime Minister. The letter sent to the Prime Minister and the description of the Committee can be found in the News and Notes section. The reasons for protesting the announcement follow.

The Treasury decision came despite a request by the Federal Cabinet about a year ago, for expert advice from Services of the Department of Fisheries and Environment and Department of Transport. We understand that reviews of operations at OWS PAPA were reported to Cabinet during last spring and that they included a recommendation to continue operations at PAPA at least until March 1980, but longer if necessary (perhaps 1983), until proven, adequate substitute systems have been developed and put into operation. Our understanding of the recommendations are summarized in the News and Notes section of this Newsletter. These appeared to have been the basis of Cabinet policy until the mid-August announcement because AES, OAS and DOT were engaged during the summer in further review and forecasting of dates for implementation of substitute systems - the dates for reporting to Cabinet on matters which would potentially change the operations at PAPA are believed to be during spring of 1979. Because any changes and alternative operating procedures would take at least several months to implement and because of Canada's international obligation to the Field GARP Global Experiment it seemed that present PAPA operations were secure until 31 March 1980.

AES examinations of forecasting reliability have revealed that the loss of PAPA data, particularly from its radiosondes will result in a degradation of forecasting accuracy even to the Maritime Provinces. Thus, the dilemma of Canadian farmers in deciding when to cultivate, sow and harvest their crops and the difficulties of B.C.'s major industry in scheduling its forestry and firefighting operations will be increased. Decisions on the safety of aircraft operations under forecast weather conditions, particularly for small aircraft in coastal areas will be less reliable. But the most immediate impact will arise through the loss of the only comprehensive, reliable and permanent source of meteorological data from an upstream site over the ocean. Will the reduced ability to sense new developments and produce storm warnings mean that west coast commercial and recreational fishermen will more often have less, or even no time to haul in their catch or cut their lines and run for shelter? Will their safety and that of very large oil tankers running to and from Alaska off B.C.'s coast be exposed to increased jeopardy?

At present more than 200 large tankers per year move along the west coast; about 800 per year are forecast for the mid 1980's. Moreover, premature closure of PAPA would result in the removal of a sea-worthy ocean-ship from a handy position in the event of an accident, for Search and Rescue operations in the area. The cost-effectiveness of PAPA date in terms of Canada's economy, and more particularly in terms of safety, are difficult to assess.

The annual cost of maintaining Station PAPA is about \$5.4 million. More than 90% is absorbed in running the two weatherships. A fundamental aspect relates to the cost of substitute systems; if this is less than present costs, then eventual closure of the station should be inevitable. Consideration of all these factors (and there are others, some being alluded to in the letter to the Prime Minister) has led all professional groups involved to believe that PAPA should not be abandoned until a fully proven and effective set of substitute operations is in operation.

#### EDITOR'S COMMENTS

It appears that the CMOS is quite healthy and still growing. (See News and Notes article on CMOS membership). From February 1978 to July 1978 our membership has gone from 760 to 806. Although the membership list continues to grow it appears many members are not on the CMOS mailing list for the Atmosphere and Newsletter. This problem has plagued us for some time and it has been a source of criticism from many who now have ceased to be members. Brian Sagar, our Corresponding Secretary, is attempting to correct this with the U. of T. Press, however difficulties have arisen. Therefore if you are aware of members not receiving their entitled copies of Atmosphere and Newsletter please bring it to Brians' attention.

#### LETTERS TO THE EDITOR

Dear Editor;

While serving on the CMOS awards committee this past year it was brought to my attention that the President's Prize and the Student Prize are open to both meteorological and oceanographic fields while only meteorologists are eligible for award of the Applied Met. and Rube Hornstein prizes.

Now that the 'O' has been raised in the CMOS perhaps it is time to consider whether oceanographers might wish to consider establishment of an CMOS award for oceanographic contributions. What say you, oceanographers?

TED WALKER

#### NEWS FROM YOUR NATIONAL EXECUTIVE (as of September 12, 1978)

President  
Vice President  
Treasurer  
Recording Secretary  
Corresponding Secretary

Ron Burling  
John Powell  
Peter Sagert  
Tad Murty  
Brian Sagar  
Dept. of Geography  
Simon Fraser University  
Burnaby, B.C.  
V5A 1S6  
(604) 291-3327

News from National Executive continued

1. Executive Meeting Number 1 of the CMOS was held July 26, 1978 in Vancouver.
  - a. John Powell attended a meeting on Forestry Meteorology in Ottawa. This meeting is sponsored jointly by W.M.O., and C.F.S. and A.E.S.
  - b. The executive appointees to assist the vice president are P. Sagert, Citations Committee; T.S. Murty, Awards Committee and R.B. Sagar, Nominating Committee.
  - c. Schedule of meetings:  
Second Business Meeting - September 13, 1978  
First Council Meeting - October 12, 1978  
Third Business Meeting - November 15, 1978  
Fourth Business Meeting - December 13, 1978  
Fifth Business Meeting - January 17, 1979  
Second Council Meeting - February 14, 1979
  - d. Report on Meteorological Consulting Standards in Canada. The excellent report was accepted and the ad hoc Committee was dissolved. A new ad hoc Committee was formed to review and evaluate the CMOS members' reactions to the report. See News and Notes.
  - e. CMOS will write to Prime Minister, Leaders of the Opposition and the Premiers regarding the resolution on freedom of information. (See News and Notes section).
  - f. CMOS will send a copy of the report on weather modification to Dr. A.E. Collin. Any CMOS member wishing a copy of this report prepared by our Scientific Committee may contact Brian Sagar, CMOS Corresponding Secretary.

NEWS FROM YOUR CENTRES ( as of September 8, 1978 )

VANCOUVER	President	Paul Le Blond
	Vice President	John Knox
	Secretary Treasurer	Vello Puss
	Pro. Director	Noel Boston

A meeting will be held in late September to elect a new executive and to discuss the matters raised in the Vice President's letter. Alcoholic refreshments are to be available.

The oceanographic posters have now been placed on two ferries, Queen of Victoria and the Queen of Vancouver.

ALBERTA	President	Lub Wojtiw
	Vice President	Randy Angle
	Secretary Treasurer	V. Mann
	Past President	Bob Humphries

No report received.

REGINA	President	Don Bernachi
	Secretary Treasurer	Clarence Spelchak

A meeting hosted by the Saskatoon Chapter was held on June 13th. The speaker was Dr. J. Pakiam and his talk was entitled Radar Observation of Thunderstorms.

The first meeting of this season will be held in late September. The location of the meeting is unknown at this time however the speaker will be C. Spelchak and D. Bauer and their talk is Current Uses of Satellite Photo Imagery.

WINNIPEG	President	Jay Anderson
	Vice President	George Moody
	Secretary Treasurer	Pat Murray
	Past President	Doris Siemieniuk

The Winnipeg Centre will begin its series of regular meetings in October, now that the summer doldrums have ended. A first speaker has not yet been chosen.

A plaque commemorating the winners of the first Prairie Award, as mentioned in the August newsletter, has been received. In addition prizes were awarded to the recipients. Rick Raddatz received a membership in the CMOS while Ken Fluto was presented with a copy of "Who Has Seen The Wind" by W. O. Mitchell.

TORONTO	President	Mike Hewson
	Treasurer	Dave Phillips
	Secretary	Fred Conway
	Pro. Director	Oscar Koren
	Past President	Nancy Waller

No report received.

OTTAWA	President	Neil Campbell
	Vice President	E.J.A. Hamilton
	Secretary Treasurer	R.B. Saunders
	Past President	Don Boyd

An executive meeting was held August 24 to plan this coming seasons' program.

The first general meeting of the season will be held September 28. This meeting is scheduled to be held at the Transport Canada Training Centre. The speaker at this meeting will be Dr. Horst Leese from the Ministry of Defense, Federal Republic of Germany. Dr. Leese will talk about the Meteorological and Oceanographic services of the Federal Republic of Germany.

MONTREAL	President	Hubert Allard
	Secretary	Gilles Desantels
	Treasurer	Jean-Guy Cantin
	Past President	Conrad East

No report received.



QUEBEC	President	Ghislain Jacques
	Vice President	Jean Pierre Fortin
	Secretary	Guy Bergeron
	Treasurer	Gaetan Soucy
	Past President	Gaston Paulin

During the summer from July to August the Quebec Centre's Mobile - Meteorological Station has been lent to a group interested in natural sciences.

An executive meeting was held August 29 to discuss plans for this coming season.

HALIFAX	President	Stu Smith
	Secretary	Jean Thiebaut
	Treasurer	Ed Guimond
	Past President	Rod Shaw

The first meeting of the season is planned for October 18, at the Bedford Institute of Oceanography. The speaker will be C. W. Snoek from the Nova Scotia Technical College. His talk is on Power From Ocean Waves.

The second meeting is to be held November 15 at the AES in Bedford. Speakers are to be R. Shaw and others. The talk will be on Demonstration of Meteorological Information and Instrument Kits being donated by Halifax Centre for use in the High School System,

Here is a description of the educational kits prepared by the Halifax Centre.

The Educational Committee is in the process of assembling 15 kits to be placed in Teacher Resource Centres operated by the Nova Scotia Museum throughout the province. Each kit will contain 6 pictures of Meteorological Instruments, 6 cloud pictures, 6 pictures of weather phenomena (each 13 x 18 and in colour), 6 coloured view aids, a book of long life spirit masters, an aneroid barometer, a sling psychrometer, a radiosonde, weather maps with corresponding satellite photos, and a teacher's guide. These kits are being paid for with surplus subvention funds and the target date for placing the kits is September 1978.

#### NEWS AND NOTES

##### Letter to the Prime Minister re Ship PAPA

Dear Mr. Prime Minister;

The Canadian Meteorological and Oceanographic Society deeply regrets the announced termination of the Ocean Weather Station at 50°N, 145°W (hereinafter referred to as "Papa"), by withdrawal of the two weatherships the CCGS Vancouver and Quadra. We understand that funds for their operation have been removed from the budget of the Atmospheric Environment Service effective March 31, 1979.

The operating cost of "Papa" should be viewed in the context of the

station's strategic location. It is the only high-seas based radiosonde weather station in the entire NE Pacific Ocean, and its location at 50°N, 145°W is in an area notorious, particularly during the winter season, for some of the most intense storms of the northern hemisphere. Most storms passing "Papa" cross British Columbia and continue eastward across Canada.

The most obvious and immediate impact of the premature termination of "Papa" will be significantly reduced capability to provide warnings of adverse weather and wind-wave conditions to west coast mariners. The implications of this should be considered in regard to the safety of the fishing fleet and of commercial traffic including tankers. Moreover, British Columbia weather forecasts of all kinds, for aviation, agriculture, forestry, recreation and the general public, will be adversely affected by the loss of "Papa" data. The deterioration in accuracy of short-range (1-2 day) forecasts will be felt to a lesser extent east of the Rocky Mountain Cordillera, but longer period forecasts (3 days-1 month) for all of North America will inevitably be affected because of their dependency on the accurate prediction of large-scale atmospheric waves over the Pacific Ocean. The average position and intensity of these waves determine the major features of monthly and seasonal weather. The past two winters experienced by North America were striking examples of the downstream effect of anomalous atmospheric configurations over the North Pacific Ocean.

Atmospheric data over the world's oceans have always been expensive to obtain for obvious reasons. Fortunately, a number of nations have recognized their obligations in this regard. The U.S.A. has committed vast resources into the development and operation of its weather satellite programs. West European countries continue to share the cost of operating Atlantic Ocean weather ships. Canada's contribution to the provision of day-to-day weather information beyond its national borders has been its continuing support of Ocean Station "Papa". The impact of the premature termination of this station should, we submit, be viewed in this international context.

Canada has long respected its obligation to participate in world meteorological and oceanographic experiments (International Hydrological Decade, GARP Atlantic Tropical Experiment, etc.). It is a participating nation in the current First GARP Global Experiment (FGGE). Included in its contribution to this immense data gathering undertaking was the implicit assumption that Station "Papa" would continue to operate at least until March 31, 1980. The Society stresses the importance of carrying out this commitment.

"Papa" is a global baseline station for monitoring atmospheric carbon dioxide concentrations and is the only one over the ocean. The importance of this gas to future world climate is widely recognized; however, no valid alternative way to replace this monitoring has yet been suggested. An important oceanographic research program is carried out at and en route to the station; the importance of finding alternative ways to continue this long series of oceanic observations, the only set existing from one place, in order to evaluate the evolution of oceanic properties there, cannot be overemphasized. In addition, the ships play an important coast guard role.

A potential partial alternative to an ocean weather station is a system

combining statllite sounding data with instrumented ocean buoys. While the technology involved shows great promise, the system has not been developed to the stage where it can replace ocean-based stations without serious reductions of accuracy. The effectiveness of today's satellite sounding systems depends on the availability of conventional surface-based 'ground truth' data from key locations, such as "Papa" and the Atlantic Ocean stations. A reasonable estimate of the minimum time required for developing and placing into operation a proven satellite-buoy system to partially replace "Papa" is about five years.

In view of the foregoing considerations, the Canadian Meteorological and Oceanographic Society respectfully urges the Canadian Government to review its decision to withdraw funds for the operation of Weather Station "Papa" at the termination of the current fiscal year. The CMOS fully supports the recommendations of the Atmospheric Environment Service to continue operating "Papa" until an adequate replacement system can be developed and put in its place.

Yours sincerely,

R. W. BURLING  
President, Canadian Meteorological  
and Oceanographic Society

#### PAPA COMMITTEE

Ad hoc committee to review the present and future of Ocean Weather Station PAPA and to rormulate a Society Policy. This Committee was formed following a proposal by John Maybank during Contress. It consists of John Knox (Chairman), Ken Harry, Mike Miyake and Steve Pond. The committee was well into its work by mid-August and was able to react quickly to Mr. Andras's announcement.

#### CMOS Understanding of PAPA Recommendations

Summary of our understanding of recommendations made to DFE and DOT by Services of the two Departments. It is believed that these would have been passed to an appropriate committee of the Federal Cabinet.

Operations should be continued at OWS PAPA until proven cost-effective substitute systems are in place and integrated with the meteorological data network (this is forecast to be about 1983), but in order to meet international obligations of FGGE no changes should be made before 31 March, 1980.

Sufficient funds should be allocated to AES and OAS to design, develop, test and implement substitute systems, and that DOT seek alternate ways to meet the present Search and Rescue obligations of the weatherships.

Alternative, potential, eventual uses of the weathership and of equipment on them should be explored.

The feasibility and consequences of potential ways to reduce costs following March 1980 should be examined. These might be by replacing one weathership by an existing oceanographic vessel, and by laying up the vessels during summer.

Letter to Prime Minister re: Freedom of Information

Dear Mr. Prime Minister;

The enclosed 'Resolution on Freedom of Information' <sup>\*</sup> was passed at the Twelfth Annual General Meeting of the Canadian Meteorological and Oceanographic Society, held in London, Ontario on 31 May, 1978. Copies of the resolution are also being forwarded to Leaders of the Opposition Parties in the Parliament of Canada and to the Premiers of the Provinces.

Discussion at the Annual General Meeting was centered on the generality of the resolution. In particular, concern was expressed that demands might arise for release of scientific data in a raw, unexamined form. The general perception, however, was that the need for proper and normal scientific processing of observed data, such as the removal of instrumentation and operator errors, would be recognized by those requesting original scientific information.

The general concept of the resolution was fully supported by members of the Society present at the Annual General Meeting. It was passed without amendment to be forwarded to the appropriate authorities. The present action was decided on at the first meeting of the present Executive of the Society on 26 July, 1978.

Yours sincerely,

R.W. Burling, President  
Canadian Meteorological and  
Oceanographic Society

\* Copy of Resolution follows.

Resolution on Freedom of Information

Item 8(a), Annual General Meeting, 31 May 1978:

WHEREAS the Canadian Meteorological and Oceanographic Society affirms that a well-informed public is an essential factor in the development of an environmental ethic and in the solution of environmental problems; and

WHEREAS there is a need to establish the legal right of the Public to receive, upon request, information concerning public business, subject to certain clearly and specifically defined exemptions, with any refusal to provide the requested information subject to independent judicial review;

NOW THEREFORE BE IT RESOLVED THAT the Canadian Meteorological and Oceanographic Society advocate the enactment of Freedom of Information legislation at the federal and provincial levels.

The Ad Hoc Committee to Review and Evaluate the Meteorological Consulting Standards Report

The CMOS National Executive has formed an ad hoc committee for the review and



evaluation of the report on Meteorological Consulting Standards in Canada. The members of this committee are:

Randy Angle (Chairman)	Alberta Environment
J. Dionne	University of Quebec at Rimouski
D.P. McIntyre	Committee on Consulting Standards in Canada
Desmond O'Neil	A.E.S.

An information package will soon be sent to the local centres to facilitate discussion of the issues raised by this report. Written comments, suggestions, thoughts, ideas, opinions and view from individuals or groups are invited and welcome.

Please forward to: Randy Angle  
Air Quality Control Branch  
Alberta Department of Environment  
9820 - 106th Street  
Edmonton, Alberta T5K 2J6

#### CMOS Membership as of July 16, 1978

Dr. Brian Sagar corresponding secretary of CMOS reports the following "break-down" of our membership.

	<u>Meteorologists</u>	<u>Oceanographers</u>	<u>Students</u>	<u>Sustaining</u>
B. C.	51	33	11	4
Alberta	67	2	6	2
Saskatchewan	20	-	3	-
Manitoba	44	-	3	1
Toronto I	118	1	6	2
Toronto II	74	11	10	1
Ottawa	51	10	-	-
Montreal	79	2	13	2
Quebec	10	12	5	-
Halifax	46	42	6	2
Overseas	<u>47</u>	<u>5</u>	<u>5</u>	<u>-</u>
Total	606	118	68	14

Total membership is 806. Previous report in Vol. 6, No. 2 showed our membership at 760.

#### Retirement of Len Parent from AES

Len Parent, Chief Meteorologist at the Pacific Weather Centre and former Recording Secretary of CMOS 1976-77 has made a bold decision to cut the umbilical cord and take early retirement effective September 5, 1978. Len's decision to retire came unexpectedly to the members of this staff although in retrospect should not have. It has always been Len's admirable manner to cut clear new paths and then go on to new challenges. Len's active leadership at the Pacific Weather Centre has resulted in many innovations now in effect. Although retired from AES he is still an active member of CMOS. Len now resides with his family in the beautiful Okanagan Valley of B. C.

## 1978 CANADA-WIDE SCIENCE FAIR

Note received from Youth Science Foundation

We are pleased to advise that the winner of the Canadian Meteorological and Oceanographic Society Award at the 1978 Canada-Wide Science Fair was Mr. Andrew N. Jardine, 39 Washington Street, Moncton, N.B. E1A 3Z3 with his project entitled: Wind and Solar Power.

## HISTORY OF CANADA WIDE SCIENCE FAIR

The annual Canada-Wide Science Fair is a project of the Youth Science Foundation and is administered by that body in association with a Regional Science Fair Committee.

History Year	City	Regions Represented	Exhibits	Students
1962	Ottawa	12	45	45
1963	Toronto	18	53	53
1964	Montreal	22	60	60
1965	Winnipeg	26	68	68
1966	Windsor	26	74	74
1967	Quebec	28	73	73
1968	Vancouver	28	68	68
1969	Regina	39	64	64
1970	Hamilton	38	91	91
1971	Edmonton	34	85	85
1972	Sarnia	38	96	110
1973	Thunder Bay	38	100	124
1974	Calgary	42	112	147
1975	Jonquiere	48	134	187
1976	Brandon	48	124	167
1977	Victoria	51	137	168

## Future Fairs

1978	Sudbury
1979	London
1980	Thompson
1981	Waterloo
1982	Toronto

## Weathering the Forecast?

- from the Gazette Monday, July 10, 1978 p. 6  
sent in by Simon Kevon

### WEATHERING THE FORECAST

Everyone talks about the weather, but few know what they are talking about. That includes the weather broadcasters with their maps covered by great, swooping loops and arcane symbols. So to help our readers understand what the broadcasters really mean and to carry on an intelligible conversation, The Gazette offers these handy definitions.

Weather - A malevolent environment: "I'm afraid we're in for a

lot of weather this weekend". Weather is a severe form of wonder weather: "I wonder weather I should wear a raincoat".

Degrees - Measurements of temperature. There are many degrees of degrees: "It's going to be a very warm 24 degrees tomorrow".

Wind activity - The opposite of wind indolence. If strong enough, it can blow your mind.

Troughing - A tracheal spasm which can sometimes be treated with a precip, q.v.

Precip - An elixir obtainable on doctor's orders from a drug store on a rainy day.

Shower activity - What happens when a friend gets in with you and tries to adjust the controls.

Ridging - Getting high. It may be addictive. A recent broadcast warned of a "strong ridge holding sway for several days".

Front - A meteorological phenomenon unrelated to any known behind. Fronts may be cold or warm (but never hot), and frequently are followed by weather, q.v. A special variation is the occluded front, which is the way your eye doctor feels after too much ridging.

H - The eighth letter of the alphabet and initial of warm-weather adjectives, as in "hot, hazy, and humid - those old summertime H's" Not to be confused with H.H.H. a late well-known American politician.

Isobar - A good place to keep gin to prevent overdilution of the martinis.

Barometer - A device to measure the amount of gin left in the isobar.

Surge of 90's - (Obsolete but still heard occasionally on U.S. stations). A front of nonagenarians demanding free bus rides.

Tornado watch - A small device for timing funnel-shaped clouds. It moves counterclockwise.

#### Request for Nominations from Jaques Cattell Press

The definitive collection of scientific biographical information, AMERICAN MEN AND WOMEN OF SCIENCE, is now in its 14th revision. The Physical and Biological Sciences Section of the new edition will be published in the fall of 1979 with an estimated 130,000 entries. The National Academy of Sciences is in the process of assembling an advisory committee whose membership will be announced at a later date.

Scientists in the physical, biological and mathematical sciences who have

been profiled in previous editions of AMWS will receive forms on which to review and revise their entries during the fall and winter of 1978. Those who have moved since preparation of the last edition in 1976 should send address changes to the editors immediately.

Nomination of eligible scientists not now included in the directory is invited. There is no charge or obligation to buy involved with listing. Selection is based on attainment of the following criteria:

1. Achievement, by reason of experience and training, of a stature in scientific work equivalent to that associated with the doctoral degree, coupled with presently continued activity in such work;  
or
2. Research activity of high quality in science as evidenced by publication in reputable scientific journals; or, for those whose work cannot be published because of governmental or industrial security, research activity of high quality in science as evidenced by the judgment of the individual's peers;  
or
3. Attainment of a position of substantial responsibility requiring scientific training and experience to the extent described for (1) and (2).

Send nominations and address changes to the Editors, American Men and Women of Science, P.O. Box 25001, Tempe, Arizona 85282.

The Jacques Cattell Press of Tempe, Arizona will continue to edit the directory which will be published by the R.R. Bowker Company of New York, (a Xerox Publishing Company) under the Bowker/Cattell imprint.

#### AMERICAN MEN AND WOMEN OF SCIENCE

14th Edition

7 Volume A-Z plus Indexes volume

\$365.00/300.00 pre-publication price

\$37.50 per volume

#### OUR NEW MEMBERS

Eddy C. Carmack	West Vancouver, B. C.
Kevin P. Hamilton	Princeton, N. J. (Student)
John F. Benci	Winnipeg, Manitoba
Derek J. Milton	Winnipeg, Manitoba
Real D'Amours	Vaudreuil, Quebec
Stephen Ricketts	Slenon Park, P.E.I.
Yam Tong Tam	Waterloo, Ont. (Student)
Paul Greisman	Sidney, B. C.
Francis W. Zwiers	Halifax, N.S. (Student)
Richard J. Boyle	Pullman, Washington
James G. Droppo	Pasco, Washington
Chester W. Newton	Boulder, Colorado

#### ANNOUNCEMENTS

All members and Centres are asked to aid the hard-working members of



the Awards Committee and of the Citations Committee by submitting nominations ! Names submitted for the President's Prize, the Prize in Applied Meteorology, the Graduate Students Prize and the Rube Hornstein Prize in Operational Meteorology will be welcomed by Dr. Brian Sagar, corresponding secretary of CMOS, Department of Geography, Simon Fraser University, Burnaby, B. C. VtA 1S6.

Nominations of individuals and groups who have made outstanding contributions towards the alleviation of pollution or to the development of an environmental ethic will also be gladly received by Dr. Brian Sagar.

#### EMPLOYMENT OPPORTUNITIES

#### COMMERCIAL ADVERTISEMENTS

The CMOS Newsletter makes available space for two types of advertisements, these are employment opportunity advertisements and commercial advertisements. For details about rates and advertisement preparation contact the Editor of CMOS Newsletter.