



NRC Publications Archive Archives des publications du CNRC

Visual meteor program--IGY: bulletin no. 2

Millman, Peter M.; Burland, Miriam S.

For the publisher's version, please access the DOI link below./ Pour consulter la version de l'éditeur, utilisez le lien DOI ci-dessous.

Publisher's version / Version de l'éditeur:

<https://doi.org/10.4224/21273558>

Report (National Research Council of Canada. Radio and Electrical Engineering Division : ERB), 1958-05

NRC Publications Record / Notice d'Archives des publications de CNRC:

<https://nrc-publications.canada.ca/eng/view/object/?id=d9e20449-8390-493e-a9bc-69b0cc180888>

<https://publications-cnrc.canada.ca/fra/voir/objet/?id=d9e20449-8390-493e-a9bc-69b0cc180888>

Access and use of this website and the material on it are subject to the Terms and Conditions set forth at

<https://nrc-publications.canada.ca/eng/copyright>

READ THESE TERMS AND CONDITIONS CAREFULLY BEFORE USING THIS WEBSITE.

L'accès à ce site Web et l'utilisation de son contenu sont assujettis aux conditions présentées dans le site

<https://publications-cnrc.canada.ca/fra/droits>

LISEZ CES CONDITIONS ATTENTIVEMENT AVANT D'UTILISER CE SITE WEB.

Questions? Contact the NRC Publications Archive team at

PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca. If you wish to email the authors directly, please see the first page of the publication for their contact information.

Vous avez des questions? Nous pouvons vous aider. Pour communiquer directement avec un auteur, consultez la première page de la revue dans laquelle son article a été publié afin de trouver ses coordonnées. Si vous n'arrivez pas à les repérer, communiquez avec nous à PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca.

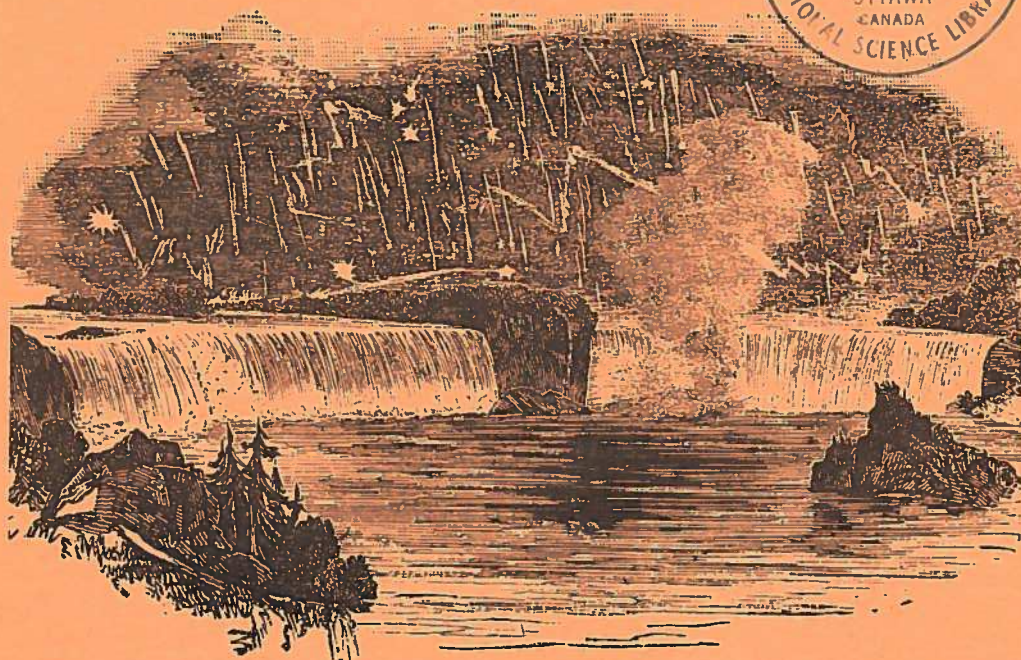


See
QC,
N2,
473

VISUAL METEOR PROGRAM — IGY

BULLETIN NO. 2

ANALYZED



LEONID METEOR SHOWER OF NOVEMBER 13, 1833

RADIO AND ELECTRICAL ENGINEERING DIVISION

NATIONAL RESEARCH COUNCIL

OTTAWA, CANADA

ERB-473

COVER ILLUSTRATION

This 19th century cut represents the famous Leonid Shower of November 13, 1833, as seen during the early morning hours over Niagara Falls. It is reproduced from the "Home Knowledge Atlas" published in Toronto, Ont., 1890. The drawing was made looking generally south, and evidently near the end of the night as the radiant, at 23 degrees north declination, would be high overhead toward dawn. The long jagged lines represent persistent trains which had lasted for some minutes and were deformed by cross-currents in the upper atmosphere. These should not be confused with the straight trails representing the meteors visible at the time for which the illustration was drawn. Estimates of the numbers of meteors seen over the whole sky ranged from 5000 to 7000 in a 10-minute interval. A contemporary description from the same source reads: "An incessant play of dazzlingly brilliant luminosities was kept up in the heavens for several hours. Some of these were of considerable magnitude and peculiar form. The wild dash of the waters as contrasted with the fiery uproar above them formed a scene of unequalled sublimity. In many districts the mass of the population were terror-struck and the more enlightened were awed at contemplating so vivid a picture of the Apocalyptic image — that of the stars of heaven falling to the earth."



Plate I — A group of Japanese meteor observers, photographed at Mr. Komaki's private observatory at Kanaya in Wakayama Prefecture, Japan. Reading around the telescope from left to right the observers are K. Doyama, M. Namera, Mrs. F. Iwasaki, K. Komaki, and Y. Kawaguchi. It will be noted from the tables that these observers have contributed a large number of reports from stations 151 and 152.

THE VISUAL METEOR PROGRAM OF THE IGY

Bulletin No. 2

May 1958

Peter M. Millman, National Research Council, Ottawa
and
Miriam S. Burland, Dominion Observatory, Ottawa

We have had an excellent response to the call for volunteers to make visual observations on a special IGY meteor program. All observations received in Ottawa up to October 15, 1957, have been reported briefly in Bulletin No. 1 [1] and in the first Progress Report [2]. We are reporting here all observations received for the six-month interval from October 15, 1957 to April 15, 1958.

Since the beginning of the program in 1957, reports have been received from an overall total of 187 different stations. Of these, 87 have been manned by groups and the remainder by single observers. The geographical distribution of these stations is given below, the figures in brackets referring to the numbers of stations.

Brazil (4)	Jamaica (1)	Puerto Rico (2)
Canada (26)	Japan (5)	South Africa (2)
England (1)	New Zealand (1)	Switzerland (1)
India (1)	Philippines (1)	United States (142)

Table 1 summarizes the observations from each station reporting during the six-month interval mentioned above. In the first half of the table are listed the stations from which observations were also included in the previous Bulletin. The identifying numbers are the same as those used previously, the order of listing being alphabetical. In the second half of the table will be found stations which are listed here for the first time. These have been assigned identifying numbers consecutively from 131 to 187.

The arrangement of columns is the same as in Bulletin No. 1. After the name of the station will be found the number of nights on which work was carried out, the number of ten-minute intervals covered, the total number of meteors recorded, and the average number of observers on duty at one time including the timekeeper. A total of 14,997 meteors observed in 7722 ten-minute periods is listed in Table 1. Taken together with those listed previously, this gives us a grand total of 33,882 meteors observed in 16,465 ten-minute periods.

Table 2 lists all personnel who contributed to the observations of Table 1 — 318 observers plus two groups for whom individual names were not reported. We have endeavoured to make this listing as accurate as possible but there are doubtless some errors and incomplete names, as the signatures on the observing sheets are sometimes difficult to read. We would appreciate being informed of any errors or omissions.

Among the groups, 94 Ottawa, Ont., No. 1; 151 Kanaya, Japan; and 86 New York, N.Y., No. 4 all observed more than 50 hours, that is 300 ten-minute intervals. 172 Rio de Janeiro, Brazil, No. 3 was within half an hour of this total. Among the single observers the following observed more than 25 hours, that is 150 ten-minute intervals: 184 Wakayama, Japan; 134 Beacon Falls, Conn; 6 Baltimore, Md; 35 Des Plaines, Ill; 57 Islip Terrace, N.Y., and 27 Clayton, Mo.

With the advent of more comfortable observing weather during the summer months it is hoped that we will have a much larger total of ten-minute observing periods to report in the next bulletin. Remember that the value of the observations depends on the number of observing periods for which results are accurately reported, rather than on any attempt to achieve a record total of meteors.

It is worth noting that in 1958 both the Perseid shower and the Geminid shower occur near new moon, and observing conditions will be particularly favourable on these occasions. We hope all observers will make a real effort to work during the Perseid maximum in August. Material collected at this time should provide excellent cross-correlations for determining systematic magnitude corrections at all stations. The special nights assigned on the visual meteor program from August 1 to the end of the IGY are listed below:

1958	September	5/6	November	3/4	December	13/14
		12/13		9/10		16/17
August 6/7		13/14		10/11		
10/11		19/20		17/18		1959
11/12	October	9/10	December	9/10	January	2/3
12/13		10/11		10/11		3/4
13/14		11/12		11/12		8/9
14/15		12/13		12/13		9/10

Note that four additional nights, two in August and two in December, have been added to the list of world days. These round out the coverage of the Perseid and Geminid showers. Bear in mind also that we are anxious to have observations made on any nights of the IGY, but those listed above should be given first preference.

Sincere thanks go to all those who have contributed so generously of their time to make possible this statistical study of meteors observed by radio and visual methods throughout the IGY.

References

1. Millman, P.M. and Burland, M.S., Visual Meteor Program — IGY, Bulletin No. 1, National Research Council Report ERB-454, December 1957
2. Millman, P.M., J. Roy. Astron. Soc. Can., Vol. 52, p. 29, 1958

TABLE 1

SUMMARY OF OBSERVATIONS ON THE SPECIAL IGY VISUAL METEOR PROGRAM RECEIVED BETWEEN OCTOBER 15, 1957 AND APRIL 15, 1958

Location	Nights	Ten-Minute Periods	Meteors Recorded	Average No. of Observers
6. Baltimore, Md.	33	226	296	1
9. Bexleyheath, England	3	32	10	1
11. Boise, Idaho	8	72	179	2
16. Brunswick, Ohio	3	19	10	1
18. Caguas, Puerto Rico	4	40	86	2
19. Caney, Kansas	4	32	11	1
20. Cape Elizabeth, Me.	10	143	169	1
21. Cedarhurst, N.Y.	7	42	30	1
22. Centreport, Penn.	14	183	346	2
25. Chicago, Ill. No. 2	3	32	66	1
27. Clayton, Mo.	21	173	137	1
28. Cleveland Hts., Ohio	1	5	6	1
35. Des Plaines, Ill.	23	215	101	1
38. Edmonton, Alta. No. 1	3	17	17	3
39. Edmonton, Alta. No. 2	7	47	318	5
40. Elyria, Ohio	2	12	10	3
41. Emporium, Penn.	5	35	19	2
43. Fort St. John, B.C.	2	13	5	1
45. Fort Wayne, Ind. No. 2	8	91	35	1
46. Franklin Park, Ill.	5	42	3	1
49. Guayama, Puerto Rico	11	131	87	4
50. Hamilton, Ont. No. 1	4	45	95	5
56. Ions, Ohio	4	57	65	2
57. Islip Terrace, N.Y.	28	197	173	1
59. Kingston, Jamaica	2	12	24	4
61. Lodi, Cal. No. 1	6	67	45	1
62. Lodi, Cal. No. 2	8	81	196	1
63. Los Angeles, Cal.	9	54	101	1
65. Lucerne, Switzerland	8	56	120	1
69. Minneapolis, Minn. No. 1	15	90	56	2

Location	Nights	Ten-Minute Periods	Meteors Recorded	Average No. of Observers
71. Montgomery, Ala.	2	6	13	1
72. Montreal, P.Q.	10	113	71	5
73. Moose Jaw, Sask.	3	48	292	8
74. Morton Grove, Ill.	2	11	7	1
79. Newark, Ohio	6	54	50	1
86. New York, N.Y. No. 4	37	317	1757	1
93. Omaha, Neb.	6	37	117	2
94. Ottawa, Ont. No. 1	12	442	1086	5
95. Ottawa, Ont. No. 2	1	1	1	1
98. Pittsburg, Penn.	18	140	166	1
100. Poughkeepsie, N.Y.	7	40	21	1
104. Regina, Sask. No. 1	8	73	327	5
111. San Jose, Cal.	3	15	130	5
113. Scranton, Penn. No. 1	3	18	21	1
115. Shediac, N.B.	1	9	4	1
116. Shelby, Ohio	2	5	4	1
120. Teaneck, N.J.	8	51	89	1
122. Vancouver, B.C. No. 1 (Kitsilano)	2	7	43	3
126. Western Springs, Ill.	7	225	735	5
127. West Nanticoke, Penn.	2	12	1	1
130. Woonsocket, R.I.	3	18	14	1
131. Arlington, Cal.	2	25	247	11
132. Aster, N.Y.	4	42	128	1
133. Bayside, N.Y.	5	76	149	1
134. Beacon Falls, Conn.	30	292	565	1
135. Brooklyn, N.Y. No. 3	4	16	9	1
136. Broomall, Penn.	1	6	1	1
137. Calcutta, India	2	23	-	1
138. Centreville, Va.	19	131	237	1
139. Cleveland, Ohio	6	22	18	1
140. Danville, Ill.	1	3	3	1
141. Dayton, Ohio	1	5	8	1
142. Dyersburg, Tenn.	3	20	42	3
143. Elkgrove, Cal.	6	54	190	1
144. Elkton, Md.	4	33	44	1
145. El Paso, Texas	1	15	1	1

Location	Nights	Ten-Minute Periods	Meteors Recorded	Average No. of Observers
146. Haliburton, Ont.	1	6	58	6
147. Hamilton, Ont. No. 2	3	10	7	1
148. Houston, Texas	8	106	612	3
149. Ichinomiya, Aichi, Japan	6	44	67	-
150. Johannesburg, S. Africa	9	66	85	1
151. Kanaya, Japan	40	375	835	1
152. Kibi, Japan	31	225	367	1
153. Kingston, Ont.	1	7	5	1
154. Kishiwada, Japan	9	127	307	-
155. Leavenworth, Wash.	8	107	207	2
156. Little Falls, N.J.	5	39	14	1
157. Malate, Manila, Philippines	8	80	7	2
158. Merrimac, Mass.	6	79	51	1
159. Minneapolis, Minn. No. 3	8	98	220	1
160. New Bedford, Mass.	1	7	16	1
161. New York, N.Y. No. 7	2	2	4	1
162. Peterborough, N. Hampshire	1	3	6	7
163. Philadelphia, Penn.	2	32	1	2
164. Plainview, Ark.	1	6	1	1
165. Port Alice, B.C.	7	26	12	1
166. Pretoria, S. Africa	14	156	515	2
167. Red Bluff, Cal.	13	86	1	1
168. Regina, Sask. No. 2	1	22	11	3
169. Richmond, Va.	2	12	18	4
170. Rio de Janeiro, Brazil No. 1	16	124	81	2
171. Rio de Janeiro, Brazil No. 2	4	24	14	1
172. Rio de Janeiro, Brazil No. 3	42	297	259	2
173. Rio de Janeiro, Brazil No. 4	1	9	1	1
174. St. Albans, W. Va.	7	41	37	1
175. St. Paul, Minn.	14	98	85	1
176. Salem, Ohio	8	114	461	3
177. Salem, Oregon	2	14	4	1
178. Santa Maria, Cal.	5	30	9	1
179. Sebastopol, Cal.	4	36	27	2
180. Sheffield, Ala.	7	49	45	1

Location	Nights	Ten-Minute Periods	Meteors Recorded	Average No. of Observers
181. Springfield, Mass.	3	18	29	1
182. Turtle Island, Ont.	2	4	3	1
183. Vancouver, B.C. No. 2 (Kerrisdale)	2	12	101	4
184. Wakayama, Japan	26	383	907	1
185. Washington, D.C.	1	6	3	4
186. Wellington, C.I., New Zealand	11	70	85	1
187. Worthington, Ohio	1	6	12	6
TOTAL		7,722	14,997	
TOTAL, BULLETIN 1		8,743	18,885	
GRAND TOTAL		16,465	33,882	

TABLE 2
PERSONNEL WHO HAVE TAKEN PART IN THE OBSERVATIONS

LOCATION	NAME(S) REPORTED IN TABLE 1		
6. Baltimore, Md.	K. Delano		
9. Bexleyheath, England	K. Herbert	B. Wiltshire	
11. Boise, Idaho	B. Brewer	T. Cochran	L. Moulton (Miss)
	H. Richards	J. Westby	
16. Brunswick, Ohio	H. Decker		
18. Caguas, Puerto Rico	L. Cruz	J. Jimenez	A. Nieves
	G. Ruiz		
19. Caney, Kansas	P. Holt		
20. Cape Elizabeth, Me.	R. Dole		
21. Cedarhurst, N.Y.	E. Heinhold		
22. Centreport, Penn.	C. Henn	R. Machemer	
25. Chicago, Ill. No. 2	D. Fretland		
27. Clayton, Mo.	D. Megginson		
28. Cleveland Hts., Ohio	J. Breckinridge		
35. Des Plaines, Ill.	G. Rippen		
38. Edmonton, Alta. No. 1	A. Dalton	E.H. Gowan	F. Loehde
	D. MacPherson	D. Morrison	C. Rosenfield
	D. Rosenfield		
39. Edmonton, Alta. No. 2	R. Allin	W.H. Hendey	G. Marliss
	D. Marven	E. Milton	L. Sterling (Miss)
40. Elyria, Ohio	T. Beam	G. Diedrich	
41. Emporium, Penn.	D. Johnson	D. Regester	J. Strycula
43. Fort St. John, B.C.	R.W. Brown		
45. Fort Wayne, Ind. No. 2	D. Nelson		
46. Franklin Park, Ill.	A. Demos		
49. Guayama, Puerto Rico	R.M. Baquero	R. Orliz	C. Sanchez
	C. Santiago	G. Vicil	
50. Hamilton, Ont. No. 1	S. Buntain	J.G. Craig	J.G. Craig, Jr.
	B. Guthrie	H. Hiddink	T. Mitchell
	R. Nielson	L. Powis	J.H. Sled
	S. Swannie	J.A. Winger	
56. Ions, Ohio	D. Hansen	G. Miller	
57. Islip Terrace, N.Y.	W. Webster		
59. Kingston, Jamaica	D. Bardens	R.P. Gardener	E.C. Melville
	M. Schleifer	L.A. Vincenz	

LOCATION	NAME(S)		
61. Lodi, Cal. No. 1	R. Birch		
62. Lodi, Cal. No. 2	P. Sheehan		
63. Los Angeles, Cal.	T. Quinn		
65. Lucerne, Switzerland	E. Roth		
69. Minneapolis, Minn. No. 1	R.H. Scrimshaw	M. Weidner	
71. Montgomery, Ala.	J. Connell		
72. Montreal, P.Q.	N. Altavilla	E.E. Bridgen	A.L. Burran
	W. Clark	E. Danson	C.L. Drolet
	G. Gaherty, Jr.	L. Gomberg	C.M. Good
	R. Harper	B. Lapin (Mrs.)	B. Mahlstock
	F. Mendelssohn	M. Mendelssohn	T.F. Morris
	C. Papacosmas	D. Sands	S.M. Sundell
	G. Wedge	V. Williams	I.K. Williamson (Miss)
	L. Wilson		
73. Moose Jaw, Sask.	B. Bell	D. Birley	J. Birley
	J. Conway	F. Cushing	W. Edgar
	E. Freidin	L. Larsen	L. Paulette
	G. Poulton	R. Quinn	L. Stall
	H. Thornton		
74. Morton Grove, Ill.	R. Jornd		
79. Newark, Ohio	N.R. Colangelo	B.A.S.	
86. New York, N.Y. No. 4	M. Churns (Miss)	A. Pearlmutter	
93. Omaha, Neb.	T. Dwyer	R. Haas	P. Kristy
	C. Moroson		
94. Ottawa, Ont. No. 1	M. Baker (Miss)	M.S. Burland (Miss)	D. Chambers (Miss)
	K. Christie	D.G. Cochrane (Miss)	V. Gaizauskas
	W.A. Gault	M. Henderson (Mrs.)	E. Hutchinson (Miss)
	M. Lintell (Miss)	J.L. Locke	P.M. Millman
	S.A. Mott	G. Paquette	S. Rao
	J.A. Rottenberg	L. Smith	S. St. Jean (Miss)
	J. Stewart (Miss)	B. Veasey (Miss)	N. Weston (Mrs.)
	R. Wlochowicz		
95. Ottawa, Ont. No. 2	E.G. Lomas		
98. Pittsburg, Penn.	W.A. Feibelman		
100. Poughkeepsie, N.Y.	F. Greer		
104. Regina, Sask. No. 1	B. Christian (Miss)	K. Cranna	G. Grantham
	D. Hallsworth	G. Harwood	W. Hind
	J. Hodges (Mrs.)	J.V. Hodges	H. Hunter
	J. Kowalchuk	C. Lokken (Miss)	E. Majden
	B. McLean	J. Perry	K. Silzer
	M. Worel		
111. San Jose, Cal.	S. Bienda	R. Cunningham	D. Del Grande
	G. Gardener	T. Storey	J. Styczynski
113. Scranton, Penn. No. 1	J. Kosmo		
115. Shediac, N.B.	A.R. MacLennan		

LOCATION	NAME(S)		
116. Shelby, Ohio	J. Horner		
120. Teaneck, N.J.	J. Shelby (Miss)		
122. Vancouver, B.C. No. 1	G. Smith	M. Taylor	J. Wilson
126. Western Springs, Ill.	L. Herche	R. Rexford	R. Rowe
	A. Smith	N. Solliday	F. Surls
127. West Nanticoke, Penn.	H. Humphries		
130. Woonsocket, R.I.	R. Latour		
131. Arlington, Cal.	P. Cullen	G. Fontaine	R. Frickin
	W. Greenwald	R. Gudith	F. Jones
	H.E. Kaiser	R. Palmer	L. Papagna (Miss)
	C.K. Peters	C. Phillips	M. Phillips
	R. Reed	D. Schneider	R. Schneider
	W. Wollen		
132. Aster, N.Y.	G. Bergman		
133. Bayside, N.Y.	J. Conte		
134. Beacon Falls, Conn.	T.J. Bolinski		
135. Brooklyn, N.Y. No. 3	J.S. Levine		
136. Broomall, Penn.	R. Field, Jr.		
137. Calcutta, India	S.I. Ghosh		
138. Centreville, Va.	M.E. Bishop		
139. Cleveland, Ohio	K. Hicks		
140. Danville, Ill.	M. Zillman		
141. Dayton, Ohio	S.H. Moon (Mrs.)		
142. Dyersburg, Tenn.	B. Holmes	J. Jenkins	T. Moss
	B. Stanfield	D. Taylor	A. White
143. Elkgrove, Cal.	J. York		
144. Elkton, Md.	P. Miscall		
145. El Paso, Texas	L. McCormick (Mrs.)		
146. Haliburton, Ont.	M.S. Burland (Miss)	J.A. Gerhard	M. Gerhard (Mrs.)
	A. Robertson (Miss)	D. Robertson (Mrs.)	H. Robertson
147. Hamilton, Ont. No. 2	D. Murthie		
148. Houston, Texas	M. Erthur	B. Farmer	A. Ferguson
	T. Fitzgerald	D. Milon	A. Parker
149. Ichinomiya, Aichi, Japan	Ichinomiya Meteor Observing Group		
150. Johannesburg, S. Africa	J.H. Botham		
151. Kanaya, Japan	K. Iguchi	K. Komaki	M. Namera
152. Kibi, Japan	F. Iwasaki (Mrs.)	F. Iwasaki	
153. Kingston, Ont.	A.V. Douglas (Miss)		
154. Kishiwada, Japan	U.S. School Astronomical Observation Club		
155. Leavenworth, Wash.	Stuart Emig	Stanley Emig	

<u>LOCATION</u>	<u>NAME(S)</u>		
156. Little Falls, N.J.	Wm. Hackos		
157. Malate, Manila, Philippines	G.Q. Macias	N. Sarmiento	B.P. Seno
158. Merrimac, Mass.	R.B. Kelly		
159. Minneapolis, Minn. No. 3	B. Steger		
160. New Bedford, Mass.	R. Jepson		
161. New York, N.Y. No. 7	S.S. Chizzoniti		
162. Peterborough, N.H.	A. Abeson	B. Croin	M. McNitchren
	B. Nickols	J. Schneider	R. Smith
	S. Smith		
163. Philadelphia, Penn.	J. Nemiroff	S. Primavera	
164. Plainview, Ark.	E.T. Hyde		
165. Port Alice, B.C.	H. Barclay	A. Woo	
166. Pretoria, S. Africa	J.C. Bennett	M. Hastings (Mrs.)	P. deLange (Miss)
	C. Malan	P. Perry (Mrs.)	R.F. Smith
	N. Van der Vlist	J.A. Venter	S. Venter
167. Red Bluff, Cal.	F. Wyburn		
168. Regina, Sask. No. 2	J. Dunn	J. Hodges (Mrs.)	J. Hodges
169. Richmond, Va.	S. Clark (Miss)	P. Connell	S. Grandiez
	D. Hoff	E.C. Hoff	T. O'Keefe
	L. Sikkelee	J. Stone	
170. Rio de Janeiro, Brazil No. 1	A. Fucs		
171. Rio de Janeiro, Brazil No. 2	P. Silva		
172. Rio de Janeiro, Brazil No. 3	H. Bucher	L. Bucher	G. Daçet
	K. Kudlacek		
173. Rio de Janeiro, Brazil No. 4	H. Melzer		
174. St. Albans, W. Va.	R.W. Smith		
175. St. Paul, Minn.	R.A. Gorkin		
176. Salem, Ohio	B. Broomall	D. Carroll	F. Catlos
	G. Scullion	V. Taus	
177. Salem, Oregon	R.M. Bales		
178. Santa Maria, Cal.	D.W. Savage		
179. Sebastopol, Cal.	C. McLendon	S. Tillinghast	
180. Sheffield, Ala.	R. May		

<u>LOCATION</u>	<u>NAME(S)</u>		
181. Springfield, Mass.	B.W. Daury		
182. Turtle Island, Ont.	L. Rimmel (Miss)		
183. Vancouver, B.C. No. 2	D. Docherty	N. Eisner	P. O'Kelly
	M. Taylor	J.B. Wilson	
184. Wakayama, Japan	A. Kamo		
185. Washington, D.C.	C. Fetrow	W.L. Isherwood	C. Linden
	R. McCracken		
186. Wellington, C.I., N.Z.	N.K. Keen		
187. Worthington, Ohio	H. Balsiger	R. Leasure	B. Maestre (Miss)
	L. Maestre	G.J. Nielson	D. Williams