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Subseries: China File, Correspondence File

OA/ID Number: 25872
Folder ID Number: 25872-005

Folder Title:
1975 Correspondence Pet - Ples

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Agency Referral/Mandatory Review Disposition Sheet

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DOCUMENT NO.	ACTION TAKEN	DATE OF ACTION	RECLASSIFICATION	CASE NO.
01	Document Remains Classified in Full	8/2/2004		2004-0612-MR/7

COLLECTION *George Bush Personal Papers*
China File
Correspondence File

FILE LOCATION 1975 Correspondence Pet-Ples

OA/ID NO.

My dearest Bar: George, ^{JF 50.12}



Peter, Deborah and I thank you sincerely
for your thoughtful expression of sympathy
in the loss of our beloved Jerry.

Your letter, George, was waiting
here at 5171 Palisade Ln. for me when
I arrived last night. It helped so much
to soften what was a most traumatic home-
coming. The memories of this home
are almost more than I can bear. But
my dear friends ease the way. Lovingly, Mike

6005
Flanagan

CORINTHIAN BROADCASTING CORPORATION 280 PARK AVENUE, NEW YORK, NEW YORK 10017, OX 7-9400

C. Wrede Petersmeyer, Chairman of the Board

July 25, 1975

ans 8-13
hand

Dear George:

I want to tell you how deeply appreciative Frances and I are for your willingness to have Gregg in Peking and for the hospitality you are showing him. Gregg was so excited all winter and spring about even the possibility, remote as it was, of his spending some time in Peking this summer, and his excitement and pleasure were overwhelming when we saw him in England in June after he had learned of your invitation and when his visa for China was approved.

For anyone to be in China right now, and particularly for someone of Gregg's age, is a once-in-a-lifetime experience and he knows it. He is very fond of you and obviously you have an interest in and affection for him.

His fiancée Fitzie has just called to report that she had received first word of Gregg from Peking. It was written the day after he arrived and he was enormously excited about everything, i.e., your meeting him, his bicycling with Barbara and you, and the trip he was leaving on with you and Barbara and others for six days to some, I gather, rather remote cities.

Frances and I have been concerned about Gregg's imposing on you for a full month and hope that if his visit becomes inconvenient for you and Barbara, Gregg will leave before the month is out. Certainly he has plenty to do to get organized for his nuptials in September. I am sure Gregg feels that he would like to absorb as much of China as is possible and that the opportunity to re-visit may not come again or, if so, not for a long time. Hence, he wants to make the most of this opportunity, which is understandable.

As you know from Gregg, he had a very strenuous experience in India, Afganistan, Nepal, et al., this spring, was sick with food

poisoning and lost 20 to 25 pounds. Fizzie was disturbed with the way he looked when she saw him in England in last May. He looked somewhat better when Frances and I saw him in June, but still very thin. What he looked like when he arrived in Peking after ten days on the Trans-Siberian railroad I hate to imagine!

From time to time I will send Gregg clippings that I think are of particular interest to him and some of them possibly to you. I am attaching a column by Bill Safire on England's problems that you might find interesting and I know Gregg will. There also is an insert on "Peking, on the Women's Parley."

Again, Frances and I cannot begin to thank you enough for your friendship and the hospitality you are extending to Gregg.

Warm regards,



The Honorable George Bush
Ambassador
U. S. Liaison Office
Peking
Department of State
Washington, D.C. 20520

P.S. For what it is worth, someone the other night told me that Jimmy the Greek had certain odds that you would be the President's selection for Vice President. I also heard the other day that Bo Callaway had stated in response to a question about Rockefeller that the President might feel it desirable to have a younger man. Straws in the wind?

September 24, 1975

C. Wrede Petersmeyer, Esq.,
280 Park Avenue
New York, N.Y. 10017.

Dear Wrede:

Your great letter of August 25 was here
in China when I returned yesterday.

It was too kind. Bar and I love Gregg
almost like our own son. We want great
happiness for him, and having him with us
was our treat, believe me.

You are a thoughtful guy, and your
letter meant a lot to me.

Yours very truly,

George Bush

C. WREDE PETERSMEYER
280 PARK AVENUE
NEW YORK, NEW YORK 10017

August 25, 1975

The Honorable George H. Bush
Ambassador
U. S. Liaison Office
Peking
Department of State
Washington, D. C. 20520

SEP 1 1975

Dear George:

I received your nice letter of August 15. Gregg arrived home a week ago yesterday, full of marvelous experiences in Peking, and other cities in China, thanks to you and Barbara. He has expressed many times his admiration and affection for both of you.

I wanted you to know that one of the most rewarding elements of his time in Peking was the opportunity to exchange views with you on Nixon and Watergate. Needless to say, Gregg was distraught in connection with the Nixon debacle and was defensive in discussing the subject with almost everyone, including his own family. I think the fact that he has been out of the country for a year and most particularly the opportunity to discuss the subject with you have given him a perspective that was sorely needed. In response to a question from one of his sisters about what you thought about Nixon, Gregg commented that your views were not different from his except that you had "the maturity of an additional 25 years." You have performed a service that has been extremely meaningful to Gregg, for which Frances and I are most grateful. There is something special about a relationship between a young man and an older person, outside the family, where there is the deep respect and high regard that there is between you and Gregg. Your friendship has meant a great deal to him.

Frances called Barbara in Main yesterday and had a nice long chat with her. Gregg and Fizzie's wedding plans are progressing on schedule. Their separation was much too long and particularly tough for Fizzie.

Again let me express on behalf of the whole family deep appreciation for all you have done for and meant to Gregg.

Warm regards,



October 10, 1975

Mr. Gregg Petersmeyer,
6 Northway,
Bronxville, N.Y. 10708.

Dear Gregg:

Bar was in tears, and I was overwhelmed by that beautiful present. We had not looked in the trunk, and so we came upon it as a total surprise. You knew how much I loved that plate. Now in looking back I am sure my indiscrete comment that Bar loved it more than anything she had seen swung you into action.

At any rate, we will have it all our lives and it will make us think happily of you.

Give our love to Fitzie. May your life be full of happiness now and evermore.

Warm regards,

George Bush

September 24, 1975

Dear Bob and George,

I have delayed writing this letter until you had both returned to Peking because I want to give you a gift at the same time. This may sound a little confusing but you will understand in a moment.

The month I spent with you, George, and the two weeks with you, Bob were of larger personal value to me than either of you know. Of course I had fun, was fascinated by many things I saw and did, and enjoyed people I met at the mission office and elsewhere in China. For these opportunities I am as grateful as I can be. I will never forget your generosity. While it is hard to imagine at my age and station how I might repay you both, please know that I would now if I could or will someday in the future if I can.

But the reason I say the value to me is greater than you know is not for what I did in China. Rather it is for the kind of people you both are, and for my reaction to you. I am at one of life's crossroads now. From a family standpoint I am about to begin a marriage. From a personal standpoint I am trying to cement a character that will stand firm through long decades of adulthood. On both accounts your example was what I had hoped it would be, and it has helped me.

Now you must go on a little hunt for a gift I left behind for you both! It is in the living room, in the leather trunk.

Devotedly,

Guy

November 7, 1975

Mr. Gregg Petersmeyer,
Trinity College,
Oxford, OX1 3BH, England.

Dear Gregg:

I wrote the attached to David and Julie.
Apparently they are coming here under the
auspices of the Chinese.

We are off to a new, tough assignment,
as I'm sure you've seen in the papers over
there. It won't be easy, but it should be
fantastically interesting in spite of all
the flack.

I will be happy when you come by to
see me when you are on vacation.

Our love to Fitzie. She wrote us a
neat letter awhile back.

Warm regards,

George Bush

October 7, 1975

5451 9 AOR

Dear George,

We just arrived in Orford. The wedding went beautifully. Everyone seemed to enjoy himself. Fitzie and I had the best time of all. We came to England on the QE2, which was pleasant in every way. Although we have not yet finished unpacking, we are settling in. I will write you and Bar, and Jennifer once we are a little more organized. Fitzie will write you and Bar to join me in thanking you for the wedding gift of a soufflé dish we are looking forward to using.

I am writing now to tell you that I passed along to Julie and David your invitation for them to come to visit China as your and Bar's houseguest. They are both very interested in pursuing the invitation with you. David is in his final year of law school so the most likely possibility would be sometime during his Christmas recess. I reminded them that you would not be in China forever. Not knowing who will follow you in the post, they see the wonderful opportunity for what it is, and are very appreciative. I spoke to

Julie last Monday (by telephone). She and David had had a chance to talk it over. I told her I would relay to you, as soon as I arrived in England, their interest in visiting you. I told her that I would suggest that you write to them directly. She agreed that that would be best. They are looking forward to hearing from you.

(D. David Eisenhower, Columbia Plaza (Apt E 303),
2450 Virginia Ave, ^{N.W.} Washington, D.C. 20037) I have treated
this as ~~confidential~~ ^{confidential}. Felix's and my best regards to Ben,
To open slit here To open slit here

Sender's name and address (Please show your postcode)

Geoff Petersmeyer
Trinity College
Oxford, England
OX1-3BH

An air letter should not contain any enclosure

By air mail Air letter
Par avion Aerogramme

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to use the
POST CODE



Amb. George Bush
U.S. Liaison Office
Peking, PRC
c/o Department of State
Washington, D.C. 20520

U.S.A.

Photocopy from George Bush Presidential Library

November 27, 1975

Mr. Gregg Petersmeyer,
15A Norham Road,
Oxford, England.

Dear Gregg:

Of course I was happy to write the attached letter.

Since your last letter things seem to have heated up at home so I am walking back into a real meat grinder. We'll probably leave here around the 10th of December. We are swamped, and so is your friend Jennifer. She'll be going back with me.

I got your message about Frank Church in your "p.s.", but I don't think I'm the guy to do that.

Warm regards,

George Bush

November 27, 1975

The Admissions Board,
Harvard Business School,
Boston, Mass. 02163.

Gentlemen:

I am writing this letter of recommendation on behalf of Gregg Petersmeyer, who is applying for next year.

I have known Gregg very well indeed. My most recent contact was last summer when he spent a month with me in Peking, China. And I had worked with him before, when he worked at the White House. He has an inquiring mind, he is bright, able and conscientious. His personality is the kind that makes him an automatic leader of men. I have known his family, and they have inculcated in him a fine sense of right and wrong.

If you have any further questions about this outstanding young man, I hope you will contact me.

I am familiar with Harvard Business School, my son George having had a marvelous experience there; and because of this familiarity and because of my very personal knowledge of Gregg Petersmeyer I know for a fact certain that he would be an excellent addition to the class entering in the Fall of 1976.

Sincerely yours,

George Bush
Chief, US Liaison Office

ccs:
The Senior Tutor's Office,
Lowell House, Lowell House,
Harvard College,
Cambridge, Mass. 02138.
and
Mr. Gregg Petersmeyer,
15A Norham Road,
Oxford, England.

15A *Norham Rd* TRINITY COLLEGE
Oxford OXFORD
OX1 3BH

November 15, 1975

Dear George,

No telling where this letter will find you.
But I hope it finds you well.

Events surrounding your life may now make the following favor too difficult. But I would greatly appreciate a short letter of recommendation to the Harvard Business School. You know that I want to attend next year. The Admissions Board relies heavily upon recommendations in determining an applicant's accomplishments, background, character, personality, leadership ability, etc. If you would be so kind as to take a few minutes to comment by letter on a couple of these areas, my case for admission would be strengthened and I would be very grateful.

The Business School will begin considering my application in early December. If you will write a letter, it should be sent to: The Admissions Board, Harvard Business School, Boston, Massachusetts 02163. A copy of the letter should be sent to: The Senior Tutor's Office, Lowell House, Harvard College, Cambridge, Massachusetts 02138.

Thank you for considering this request. Fizzie joins me in sending love to you and Bar.

Best regards,

Gregg

Gregg Petersmeyer

P.S. Screw Frank Church.

Barnard College

OFFICE OF THE PRESIDENT

COLUMBIA UNIVERSITY, NEW YORK 10027

January 20, 1975

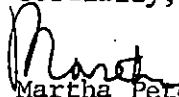
*Bar read
return for
file*

Dear George:

I appreciated so much having your good letter in December. It's amazing how close I feel to the Americans I met only briefly in China and also to the Chinese whom we met and who traveled with us. I guess that often happens when an individual moves into a totally strange environment. Since we returned, each one of us in the delegation seems to be having all kinds of opportunities to speak and write about China. I was invited to dinner the other evening with Phillips Talbot, who asked all kinds of questions about what we had seen and learned. I really felt insecure telling a person as well informed about China as he is about China today. But that didn't deter me a bit in my expression of opinion.

I suppose Barbara is back by now telling you how things are in the States. I read avidly everything that comes out of China. I hope 1975 will be a year in which we seem to have more sanity both in government and international relations. We could use a bit. We are grateful to people like you who work hard out there.

Cordially,


Martha Peterson
President

The Honorable George Bush
United States Liaison Office Peking
Department of State
Washington, D. C. 20520

MP:dw

UNITED STATES LIAISON OFFICE
Peking, People's Republic of China

April 30, 1975

Dr. Martha Peterson,
President,
Barnard College,
606 W. 120th Street,
New York, N.Y. 10027.

Dear Martha:

We had a great visit with Ken Jameison, and even though Barnard is half-way round the world your ears should have been burning. I am glad you are still touching base with your other China travellers.

I am very much concerned with the situation in all of Southeast Asia. I still feel the underpinnings of our policy with the PRC are sound, and work continues here in a fascinating fashion.

Thanks for your wonderful note of April 5. I am hoping our paths will cross again in the not too distant future. Bar feels exactly the same way.

Warm regards,

George Bush

ANDREWS, KURTH, CAMPBELL & JONES

ATTORNEYS

TWENTY FIFTH FLOOR EXXON BUILDING

HOUSTON, TEXAS 77002

TELEPHONE
AREA CODE 713
224-6616

*and hand
2-24*
CABLE ADDRESS

ANKUR

5 February 1975

Ambassador George Bush
Chief, U. S. Liaison Office
Peking, Peoples Republic of China
Care of Department of State
Washington, D. C. 20520

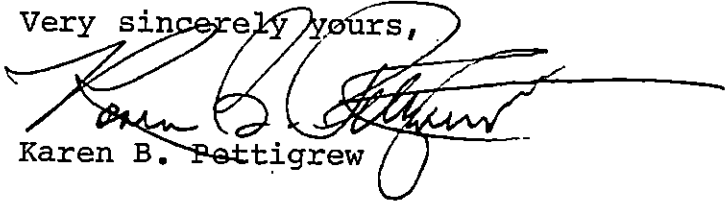
Dear Ambassador Bush:

I have only practiced law for six months, and already am perpetrating a fraud by using Mr. Baker's name as return addressee in order that this letter will reach you. Hopefully no Democrat will learn of this (or else we must be prepared for a full scale investigation). At any rate, (and in order to implicate others), let me make it clear that Jean Howard supplied me with your proper address - and both she and Jimmy Baker got great pleasure knowing that I was bold enough to write this letter.

In all truth, I am writing because I have long been an admirer of yours, have worked in your campaigns, and would dearly love the opportunity of making your acquaintance. Mr. Baker has repeatedly assured me that I will have this opportunity whenever you are next in town, but having realized that Jim's major concern when you are here is tennis, I determined that it was necessary to take matters in my own hands.

I certainly hope that you have recuperated from your recent illness and hope you realize that those of us who are Republicans in this Great State miss your presence here.

Very sincerely yours,


Karen B. Pettigrew

KBP/pjc

JERRY L. PETTIS
CALIFORNIA

WAYS AND MEANS
COMMITTEE

WASHINGTON OFFICE:
341 CANNON BUILDING
202/225-5861

Congress of the United States
House of Representatives
Washington, D.C. 20515

DISTRICT OFFICES:
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BARSTOW, CALIFORNIA 92311
714/256-4913
73-510 ALESSANDRO DRIVE
PALM DESERT, CALIFORNIA 92260
714/346-0633

February 4, 1975

Dear George:

Just a note to confirm the information Rose gave you over the phone this morning.

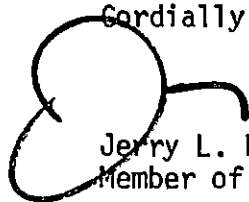
Twenty-two members of the California Agricultural Education Foundation Scholarship Program have received permission to visit the Peoples Republic of China, March 14-25. The group has expressed a desire to meet with you. I have given them your phone number in Peking and have suggested they give your office a call upon their arrival. I'm pleased you'll take the time to see them if at all possible.

We thoroughly enjoyed having you home but sorry things turned out the way they did. I know being under the weather without having Barbara's fine hand to take care of you made matters worse.

Shirley joins me in sending our love to Barbara.

Best regards,

Cordially,



Jerry L. Pettis
Member of Congress

Honorable George Bush
U. S. Liaison Office
Peoples Republic of China
Department of State
Washington, D. C.

George Bush

Don A 

Herb H 

return to GB



Department of State

TELEGRAM

ACTION:

AMB

INFO:

AMB

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UNCLASSIFIED

Classification

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FM SECSTATE WASHDC
TO USLO PEKING 5292
BT

UNCLAS STATE 100237

E.O. 11652: N/A

TAGS: AFSP

SUBJECT: CALIFORNIA ELECTION

FOR BUSH

DON RHODES, UNABLE REACH YOU BY PHONE TODAY, ASKS YOU BE
ADVISED MRS. JERRY PETTIS WON SPECIAL ELECTION CALIFORNIA
APRIL 29. KISSINGER

BT

0237

ACTION TAKEN

BY

DATE:

3/79

UNCLASSIFIED

Classification

July 8, 1975

Hon. Shirley Pettis,
5171 Palisade Lane, N.W.,
Washington, D.C. 20016.

Dear Shirley:

We loved your letter from Sea Island. It was fantastic hearing from you. I love The Cloister and I'm glad that you feel the same way about it.

We had a great Fourth of July picnic, totally relaxed, informal, very much like our Sunday lunches that we used to enjoy so much. There was a big crowd there, and we imported a bunch of coke, Miller's beer, and American hotdogs. It was a first for Peking, and I think a good one.

I hope all is well with you. We admire you and love you.

George

THE CLOISTER
Sea Island
GEORGIA 31561

June 21, 1971

Dearest Bar and George,

As I look out from our
veranda onto the satiny
sand, five miles of beach,
I can envision you two
hiking along the foamy
edge - bride and groom.

And now you are across
the earth - in Beijing!

Your visit to Palisade to
Bar; was like balm to a
very weary soul! You
create such life and
fun wherever you are.

Imagine giving your
birthday party this aft-
noon you left for China
and still apparently hav-

twenty-four hours, I feel
as though I had had a major
vacation.

The sea has always worked
magic for me — and healed,
too.

Deb is already asking
when we may come back.

It looks like a storm is
rolling in with the tide.
So I'm off for a quick
swim.

My love to you both,
Shirley

time for all last minute
well-wishers!

I've had all bedrooms
filled and no sleep for
what seems like weeks.

However, Mr. Aberschum's
(sp.?) wife has found a
Spanish speaking native
woman for me who is to
move in Sunday night.

Hopefully, this will
solve the household
problems. Even bath
air conditioning units
went out last week when
it was ninety-six!

Though Deb and I
have been here less than

GEORGE H. PFAU, JR.
ONE BUSH STREET
SAN FRANCISCO, CALIFORNIA 94104

File

January 17, 1975

Dear Poppy:

Thanks for your great letter and good wishes. Anne and I are settling into our new apartment (2810 Filmore Street, San Francisco, Ca. 94123; Telephone Number (415) 931-1067), and are busy unpacking boxes, etc. Its really exciting to be doing this at my age and with such a great C.B.

I do hope that you can come to the Grove this summer and bring a guest. But, you must line him up before March when the applications are made. Why not bring one of your new buddies, Mao, or some such?

Anne is a great student of China and has always wanted to travel there. She has not been able to get a visa or whatever you need to get in. Do you have any influence over that? Also, would it make any sense for us to try to come to the Peoples Republic of China while you are there? I know nothing about the subject, so give me some ideas or options. Sounds like you have some time on your hands (to improve your typing too). The only time we could do this would be in August since Anne has a month off then.

Anne's parents are having a reception for us next Friday (1/24), and Mack, Jenkins and Grimes will be on hand to celebrate. We had a great honeymoon on Kauai between Christmas and New Years.

White, Weld is digesting the Walker, Laird acquisition and business is still lousy. Doesn't look too promising yet, but

the economy ought to hit bottom this year or next if Ford doesn't screw it up further.

Hope all is well with you and Bar. Let me hear from you.

Sincerely yours,

*Truly,
George*

GHP/slm

Ambassador George H. W. Bush
Chief, U.S. Liaison Office
Peking, Peoples Republic of China
% Department of State
Washington, D. C. 20520

Feb. 19, 1975

Dear Lover Boy,

I tried to call you from D.C while home on consultations but it was noon and I should have known better.

Your letter of Jan. 17th was here when I got back to China- I am so very happy for you and Anne- she sounds fantastic.

As for the Grave- my plans are so vague that I can't invite anyone-it kills me, but I may not get to leave China this summer. Our kids will all be out here and the President's visit will require a lot of attention. Bar still hopes will get to Maine in August, but that is as yet unclear.

Pfau to China- a great thought. If we are here- August would be fine. Our kids will be here in June and July, but we will have plenty of room in August, unless of course we go to Maine.

How about coming at Christmas next year. It is cold then but quiet and we'd have a lot of time off to visit and see sights.. Visas are impossible unless you are personal houseguests- which of course you would be. We are deluged with help on visas but really can do em no good- except for personal guests. Our house is not fancy but it is plenty roomy and comfortable.

I love the new life and the new challenge. I miss politics but this may not be abd time to be out of the picture on politics. In an event I am working at something that I think is important. The market has shot up since your letter. I hope this has brought joy and maybe Syuan to the Pfau fortunes. How did the reception with the GB's go- the one Anne's parents gave. Send me a wedding picture- some clips etc.... also a word on how Libby is faring if you are up on that subject?

Bar is fine- loves the new life too. misses the kids but is great about it. She was home for Christams and they all rallied round, cheering her up and hanging tough together. They are all 5 just terrific- a constant joy to us in every way. Each one is doing well in college or life. Doro is at Farmington- suits her just fine.

Let me know if and when you can come. The visa should be applied for there in D.C. but when we decide on a time I'll send you a letter of invitation to accompany the visa request. Don't spread this word system around much- we are besieged with requests and some to say the least are marginal.

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GEORGE BUSH
KUANG HUA LU. 17
PEKING, PEOPLE'S REPUBLIC OF CHINA

Sept. 29, 1975

file
PFAU

Dear George,

It was great, absolutely great, having you here with us. It flew by darn it and then of course I missed the grand arrival. Meeting Anne was fantastic.

Now for some good news. You overpaid the Friendship Store by \$50.00. Here it is back- Travellers check HC 74-287-770. They are so darned honest over there.

The Spencers made it out on Sunday. I rudely didn't see them off (same treatment I gave you); but we did rack up another mens doubles win- now in semis- big deal.

Yesterday we went to Workers Stadium to see the closing of the China Games- a most colorful performance.

Thayer was bemoaning the fact you are gone. So are we. Hope you got your clean Jockey Shorts, and fun hers.

We were so pleased that the Pfaus and Spencers seemed to enjoy eachother- a good visit all around.

Adios and love,

136

WHEN COUNTERSIGNED BELOW WITH THIS SIGNATURE

HC74-287-770

J. P. Faus

BEFORE CASHING WRITE HERE CITY AND DATE

American Express Company

AT 65 BROADWAY, NEW YORK, N.Y.

Pay this Cheque to the Order of

IN UNITED STATES

IN ALL OTHER COUNTRIES

COUNTERSIGN HERE IN PRESENCE OF PERSON CASHING

J. P. Faus

James L. Faus
CHAIRMAN

\$50.00

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GEORGE H. PFAU, JR.
ONE BUSH STREET
SAN FRANCISCO, CALIFORNIA 94104

OCT 31 1975

10/23/75

Dear Barbara & George —

Thanks for your several nice notes. We are still glowing from our great visit with you. It was really great!

Pep, I can't believe I overpaid the Friendship store because I cashed all those travelers checks at the Bank of China. Needless to say, I'm happy to get back the \$50. and my creditor's here snapped it up right away. How honest can you be. —

We are watching and reading with great fascination your news of Nancy and Henry's visit and trust you are having an interesting time with them. Wish I could get your reactions first hand. The press here has been "low key" on it and certainly accurate in their description of Peking.

Our pictures turned out very well and we are now sorting out some choice ones to send to you and the Spencers. The Christmas card shot (Great Wall) was a success and the cards are ordered.

We have dispatched 3 "care" packages to you since returning (to replenish supplies) and more soon. Hope they make it.

Still no luggage and a big hassle with Thai Int'l Airlines. —

over

(2)
News from the home-front is that the old "sord
Pounder" Mack has abandoned matrimonial ~~and~~
bliss for deciding to live permanently with a very
neat gal named Christine who has been his
secretary for about 4 years. We're spending this
weekend with them and will report our
findings.

On the business front, I'm bullish on the stock +
bond market and Fred Wenthom is now our new
President. — Sub as, you made me nervous about
this. —

Poppy thanks for your touching remarks in
your last letter. I feel the same way about
our friendship. It's really great the way we can
pick it up where it last left off. I feel it will
always be this way. Also, you both made Annie
feel so great and welcome (and this is not always
easy with a new spouse). Poor dear, she felt
pretty drizzly most of her visit — but we
will always remember it as one of the
very best of all times —

Thanks again and more soon —

George ^{bee}

P.S. We are all (Hill Billies) awaiting next years
visit to SF. Annie and I want to give her
the super tour of our fair city. —



美中贸易全国委员会

The National Council for United States-China Trade

1100 Seventeenth Street, N.W., Washington, D.C. 20036 Cables: USCHINTRAD Telephone (202) 659-9490
659-9693

President

January 2, 1975

Ambassador George Bush
Chief, U.S. Liaison Office
Peking
People's Republic of China
c/o Department of State
Washington, D.C. 20520

File

Dear George,

I thought you might like to see the enclosed copy of a letter Don Burnham and I recently wrote to Wang Yao-ting of the CCPIT. No doubt, this will also be of interest to Herb Horowitz.

As you can see, we are trying to pin them down to a specific date for the arrival of the CCPIT delegation. During Gene's talks in Peking, he was promised that we would be given at least two months advance notice. If, therefore, they do come in mid-March as we have suggested; we should receive notice of their intentions by about January 15. The Liaison Office here has told us that it would be difficult for the delegation to be in the United States during the time of the Spring Canton Fair (April 15 - May 15). That is why we suggested mid-March which would give us the minimum time needed to make preparations.

If by January 20, at the latest, we do not receive confirmation of their intention to arrive here in mid-March we will probably have to assume that the visit will not take place earlier than late May. In that case do you think it would be useful to try to sound out Wang about their intentions? As you can imagine we have a lot of pressure here from our members who want the maximum advance notice in order to prepare adequately for the CCPIT visit. Of course, we would not want you to do this if you feel it would be counter-productive and so I leave it entirely to your judgement.



- 2 -

January 2, 1975
Letter to George Bush

Gene Theroux was very appreciative of the opportunity to meet with you and Herb Horowitz and for the help he received from the Liaison Office generally. I am certainly indebted to you and your son, George, for bringing Sandy Randt to our attention. He is an invaluable part-time addition to our staff and at some point I hope we can take him on permanently. I don't know how Gene could have accomplished what he did during his few days in Peking without Sandy's help.

Mabel and I had a nice chat with Barbara whom we saw at a party the Russell Trains gave just before Christmas. She seemed happy to be home among family and friends but your absence was obviously a damper to an otherwise festive season.

I'm delighted that you and Barbara have taken so readily to Flying Pigeon bicycles. With that kind of free advertising you have no doubt made a big hit with the Chinese.

I enclose the latest issue of our magazine, on page 32 of which you will find a brief article about the briefing we arranged for you here.

This brings best wishes for a very happy new year during which I hope we will have a reunion either here or in Peking.

Cordially,

Christopher H. Phillips

CHP/alm

enclosures



美中贸易全国委员会

The National Council for United States-China Trade

1100 Seventeenth Street, N.W., Washington, D.C. 20036 Cables: USCHINTRAD Telephone (202) 659-9490
659-9693

December 20, 1974

Mr. Wang Yao-ting
President
China Council for the
Promotion of International Trade
Peking
People's Republic of China

Dear Mr. Wang:

This letter is to express our appreciation that the CCPIT received our Vice President, Eugene A. Theroux, and arranged useful meetings for him with the Foreign Trade Corporations, during his visit to Peking.

Our Board of Directors met in Washington on December 4, 1974, and Mr. Theroux reported in detail about his meetings both in Kwangchow and Peking. All of us are pleased to know that the CCPIT will send a return delegation to the United States in 1975. We were also gratified to hear that their decision was confirmed during Secretary of State Kissinger's recent visit to Peking.

Our Board members requested us to suggest to you that your delegation plan to arrive in Washington, D.C. on March 15 for a visit which we hope will occupy approximately three weeks. This would provide the minimum time required for the delegation to see varied areas of our country and to visit representative industrial and agricultural concerns.

Your visit here will provide an important opportunity for representatives of your Foreign Trade Corporations to gain a better understanding of the nature of the American market. This, we hope, will lead to a more balanced trade between our two countries.



- 2 -

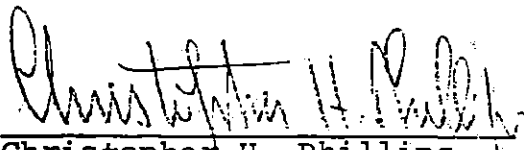
December 20, 1974
Letter to Mr. Wang

We look forward to working closely with you in the coming year and send our best personal wishes to you and your colleagues for a happy and productive New Year.

With best regards.

Sincerely yours,

D.C. Burnham
Chairman


Christopher H. Phillips
President

July 8, 1975

The Hon. Christopher Phillips,
President, The National Council
for US/China Trade,
1100 17th Street, N.W.,
Washington, D.C. 20036.

Dear Chris:

Thanks for your good letter of June 23.
We have been having a ball with four kids in
Peking and a great relaxed Fourth of July
picnic - a real first for China.

I never did thank you for those Surbex-T
pills. I am taking them regularly and my ex-
perience has been like yours: I am feeling
darn well.

I think Mel Searls will do a first-class
job. I have great respect for the work that
Gene Theroux did in that position.

As you say, the political pot is boiling,
but I am not near the boiling cauldron and I
kind of like it. I must confess I miss poli-
tics to a certain degree, but this assignment
is fulfilling and challenging in every way.

Warm regards, and love to Mabel,

George Bush

JUL 3 1975



美中贸易全国委员会

The National Council for United States-China Trade

1100 Seventeenth Street, N.W., Washington, D.C. 20036 Cables: USCHINTRAD Telephone (202) 331-0290

President

June 23, 1975

Honorable George Bush
Chief, United States Liaison Office
Peking
Department of State
Washington, D. C. 20520

JUL 2 1975

Dear George,

It took a while for your May 9 letter to reach me, but it finally did arrive on June 13.

Gene Theroux told me how much he enjoyed seeing you and Barbara on his last visit to China. He also assured me that he has mailed the list of trademark names he promised to send you.

I am very sorry to have to lose Gene as our Vice President in a couple of months, but the demands of his law firm are compelling, and he must return to full time practice. Fortunately, we have found an excellent replacement for Gene in Mel Searls, who for the past four years has been stationed in Hong Kong as Marketing Director for Esso Eastern. He has made several trips to China, has played an active role in the China Commercial Relations Committee of the American Chamber in Hong Kong and has a pretty good command of Mandarin. We expect him to join us about September 1.

I hope those Surbex-T pills will provide you with as much immunity against colds as they have me. The last one I had was in Peking in November 1973. At Bill Hewitt's suggestion I started taking one a day, and since then have avoided all colds. The doctors, of course, laugh at it, but it works for me.

I hope to see you on your next trip "East." As 1976 approaches, the political pot is beginning to simmer,



June 23, 1975

To Honorable George Bush
June 23, 1975

so perhaps you should come back to take stock!

With warm regards to you and Barbara.

October 21, 1975

Mrs. Harvey Picker,
6B, 179 E. 70th St.,
New York, N.Y. 10021.

Dear Jean:

Sorry the attached missed you in China.

It was great to see you when you were
here, even though much too briefly. Hurry
back!

Warm regards,

George Bush
Chief, US Liaison Office

Enclosures

November 27, 1975

Mrs. Jean Picker,
Edgewater Point,
Mamaroneck, N.Y. 10543.

Dear Jean:

One of the highlights of our year in China was your visit. My only regret is that we didn't have more time for a cozy substantive chat.

Soon we'll be back into a real meat grinder, but I have kind of an old-fashioned sense of duty that I cannot escape and that I don't want to escape. It will be tough, but I think the work is important.

Give my best to Harvey, and let's stay in touch.

Yours very truly,

George Bush

Jean Picker
Edgewater Point
Mamaroneck
New York 10543

November 3, 1975

Dear George:

Thanks to you and Barbara the world affairs delegation had several most enjoyable get-togethers while in Peking. Also, one Harvey Picker was very grateful for the cable out of your office to him via USUN about my whereabouts and good health.

Gerry Ogden is a very nice and competent young man and was a good addition to the group.

Today's news tells of your return to our shores in the not-too-distant future. It will be nice having you in our continent.

Sincerely,



Jean Picker

Ambassador George Bush
U.S. Liaison Office
17 Kuang Huahu
Peking
Peoples Republic of China

August 18, 1975

Mr. Gerard Piel,
Scientific American,
415 Madison Avenue,
New York, N.Y. 10017.

Dear Gerard:

Thank you for sending me your paper on Macos. I haven't kept up with the Macos furor - it's hard enough to even grasp the U.S. headlines from over here. Your paper was most informative.

I regret I have been of so little help to Andover recently, but maybe I can do better in the future.

The PRC remains a land of fascinating contrasts, and I am totally challenged trying to figure it all out - the system, the people, the whole ball of wax.

Warm regards,

George Bush

SCIENTIFIC
AMERICAN

415 MADISON AVE NEW YORK, N.Y. 10017 (212) 688-3900

Dear George

I send the attached for your information because I fear the yahoo-scandal over "Man: A Course of Study" engages the essence of the relation between the Federal government and the country's school system -- and its universities.



GERARD PIEL

CONFIDENTIAL: This statement has not been ratified by the Review Group and we are still deliberating.

January 17, 1975

Mr. Gerald S. Pierce
Director of International Studies
Memphis State University
Memphis, Tennessee 38152

Dear Mr. Pierce:

Thank you for your recent letter. You did the right thing in sending a copy of the letter to Ambassador Huang Chen at the PRC Liaison Office in Washington. My advice would be that if you are in Washington to go by and talk to the Liaison Office people. The China Travel Service letter will be helpful too.

We have found on these kinds of programs we are not able to assist much from this end. Needless to say, if an opportunity does arise to put in a plug for your work we will be happy to do so.

Good luck.

Sincerely,

George Bush



MEMPHIS STATE UNIVERSITY
MEMPHIS, TENNESSEE 38152

Office of International Studies

December 18, 1974

The Honorable David K. Bruce
Chief U. S. Liaison Officer
U. S. Liaison Office
Peking, China

Dear Mr. Ambassador:

On the advice of the office of Senator William Fulbright, I have written the enclosed letter to the China International Travel Service, Peking, outlining a proposal for a travel segment in the People's Republic of China for a program in early childhood education that we hope to conduct in East Asia in July and August, 1975.

If your office can assist us in any way in facilitating the making of arrangements for this program, I will be most appreciative of your help.

Very truly yours,

Gerald S. Pierce
Director of International Studies

W. B. Bush



MEMPHIS STATE UNIVERSITY
MEMPHIS, TENNESSEE 38152

Office of International Studies

December 18, 1974

Luxingshe
China International Travel Service
Hsitan Building
Peking, People's Republic of China

Sirs:

Memphis State University's Early Childhood Education Center wishes to sponsor a travel-study program to the People's Republic of China as part of a program in which schools in Japan, Hong Kong and the State of Hawaii will be visited. The purpose of the program will be to enable mature graduate students and college and school faculty members interested in the education of children from birth to eight years of age to study the methods employed in various Asian countries in the teaching of young children.

Our specific interests in the proposed visit to China would be the following:

- 1) to hear presentations by your scholars describing the goals and purposes of your educational programs for young children;
- 2) to visit educational facilities, such as infant and day care centers, kindergartens, primary schools, and teacher education institutions;
- 3) to observe programs for young children;
- 4) to have opportunities to discuss our observations with your specialists; and
- 5) to visit Chinese cities and cultural monuments for the participants' better understanding of the cultural setting of the educational activities being studied.

In charge of the study program would be Dr. Rosestelle Woolner, Professor of Elementary Education, Memphis State University, and Dr. Bettye M. Caldwell, Professor, University of Arkansas at Little Rock. Both professors are respected authorities in the field of early childhood education, and Dr. Caldwell was a member of a group of American psychologists and educators who visited the People's Republic of China in 1973. (Dr. Caldwell's enthusiastic presentations about her visit to China stimulated the proposal for a Memphis State-sponsored program.) Both Dr. Woolner and Dr. Caldwell have indicated their willingness to present papers to the faculties of the institutions to be visited, should that be desired.

Luxingshe
December 18, 1974
page 2

It is proposed that the group consist of some 30 people, including the two faculty directors. The group will be in Japan between July 18 and July 25. My proposal is that the group travel from Osaka to Peking on July 25 on the flight that makes an intermediate stop in Shanghai. Between July 25 and August 4, they would be in China, following an itinerary which would permit the objectives listed in the second paragraph of this letter to be met. Since the next stop on their Asian visit will be Hong Kong, it would be convenient for them to visit Canton during the latter part of their stay in China and to travel from Canton to Hong Kong by railway.

If the travel plans outlined are agreeable to you, I will appreciate your devising a tentative itinerary for their visit, informing me of the costs that would be incurred in their travel within the People's Republic of China, and giving me specific information on the means by which payment would be made.

For your information, I am enclosing the following: a statement describing this university, the College of Education and the Early Childhood Education Center; a tentative itinerary for the group's Asian travel; and brief biographical statements on the two professors who would conduct the program. If we receive approval for the travel within the People's Republic, we can furnish the information needed for visa purposes soon after the group is formed in March, 1975.

Memphis State University has already had the privilege of participating in one cultural exchange program with the People's Republic of China. Mr. Gene Bartow, coach of the Memphis State basketball team, Mr. Eugene Smith, team trainer, and Mr. Ronnie Robinson, a player on our basketball team, visited your country in the summer of 1973 in a sports exchange program arranged by the two governments. The proposed program in education would, I believe, present an opportunity for a further significant involvement of this institution in the field of cultural exchange with your country.

Sincerely,



Gerald S. Pierce
Director of International Studies

Enclosures: Statement on Memphis State University
Tentative Itinerary
Biographical Statements

Copies to: Ambassador Huang Chen
Ambassador David K. Bruce



DEPARTMENT OF STATE

Washington, D.C. 20520

September 19, 1975

Mr. James R. Pierce
Assistant to the Publisher
Outdoor Life
380 Madison Avenue
New York, New York 10017

Dear Jim:

Though we talked on the phone about this matter I have now taken up the question of hunting related travel with the State Department experts.

Unfortunately they have confirmed my initial assessment; namely that travelling in China to hunt or to write about hunting is all but impossible.

We do know there is some hunting done, merely to keep certain animal population at proper levels; but no foreigners that the Department knows of have been permitted to come to China to hunt. Many of the great hunting areas are out of bounds for travel.

Recently some mountain climbers wanted to climb in China. They were told that all the areas that interested them were off limits.

I wish my response were more helpful.

Love to Margie and all the kids. I leave today for Peking.

Sincerely,

George Bush
Chief, USLO
Peking

Outdoor Life

380 MADISON AVENUE, NEW YORK, N.Y. 10017, TELEPHONE: (212) 687-3000

JAMES R. PIERCE

ASSISTANT TO THE
PUBLISHER

August 13, 1975

Mr. George Busch
American Legation
Peking
The People's Republic of China

Dear George:

Welcome Home.

What's the Chinese Government's position on hunting in China? by Chinese? by Americans? *post report*

Our shooting editor, Jim Carmichael has been champing at the bit to come to China ever since he heard of our relationship. I thought it a good idea, but not worth the expense to the magazine and thus did not push it.

However I have heard that Sports Afield, one of our rivals, has applied for visas and I'm sitting here with egg on my face. All of a sudden people here think it's a good thing. *visas "by invitation"*

It is my general feeling that the Chinese Government would frown on such frivolity. Right? *probably*
Wrong?

I checked our library and learned that pre WWII we ran stories on tiger, leopard, wolves, Giant Bustards, various types of deer, boar, Argali sheep, Big Horn Sheep, gazelles, antelope; pheasants, various grouse, pigeons, doves, etc. This astounded me, for I thought China was fairly unstable in those days.

Margie and I will be back home Labor Day Weekend.

Best Regards,

Jim

James R. Pierce

JRP/fh

P.S. I'm talking about Jim & me and a photographer

PUBLISHED BY TIMES MIRROR MAGAZINES, INC.

Jim

UNITED STATES GOVERNMENT

UNCLASSIFIED

Memorandum

TO : Ambassador Bush

DATE: September 12, 1975

FROM : EA/PRCM - Oscar V. Armstrong *OMA*

SUBJECT: Hunting in the People's Republic of China (PRC) --
Outdoor Life's Interest

It is our impression that recreational hunting, as such, no longer exists in the PRC. Of course, some of the minority nationalities, particularly those which live in more remote regions, may do some hunting for sustenance reasons. It is also likely that officially-sanctioned hunting takes place, from time to time, to deal with losses of livestock to predators. But hunting for sport is no longer known.

We believe that there is little likelihood, under the circumstances, that American journalists interested mainly in hunting and outdoor recreation would be granted visas to visit the PRC to do stories on hunting.

UNCLASSIFIED

PGS
EA/PRCM:PGSmith:ced



5010-110

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

September 30, 1975

Mr. James R. Pierce
Assistant to the Publisher
Outdoor Life
380 Madison Avenue
New York, New York 10017

Dear Jim:

Thanks for your note of September 5, with its enclosures from Bob Rodale.

A quick look at the illustrations of the Higher Plants of the People's Republic of China shows that Amaranthus caudatus is a widespread and common weed in China, and that its seeds are considered edible. A. hypochondriacus is listed (under the name A. paniculatus L.) with the notation that it is suitable for animal and bird feed. There are several other species in China, A. retroflexus L., spinosus L., A. tricolor L., A. viridis L., and A. ascendens Loisel, which are grown for pot herbs and their presumed medicinal properties, but there is no indication that any of these are cultivated for their seed.

Chinese we have talked to know the cultivated species of Amaranthus as Hsien (), but they say they are grown for its leaves, which are used as a vegetable, and not for its seed. It is also a fairly common ornamental.

One of the by-products of the modernization of China's agriculture over the last generation has been the disappearance of many relatively unproductive landraces of common crops and of some entire crops. Hybrid corn, for example, has displaced the old Chinese races of corn as well as less productive grains such as sorghum and millet. While total grain output has unquestionably increased, many strains of possibly useful edible plants are disappearing. The grain

amaranth may be among these.

We have not yet discovered a reliable way of seed exchange with the People's Republic of China. I suggest that Rodale write the following:

Mr. Li Sen
Institute of Botany
Academy of Science
Peking
People's Republic of China

Mr. Chin Shan-pao
Institute of Agricultural
and Forestry Sciences
Peking
People's Republic of China

Mr. Chang Heng-hsien
Northwest Forestry
Institute
Harbin
Heilungkiang Province
People's Republic of China

Mr. Li Yi
Kirin Academy of Agricultural
Sciences
Changchun
Kirin
People's Republic of China

Two of these addresses are in Manchuria and the other two in Peking. Peking is the same latitude as Philadelphia, and for photoperiodic purposes seed from here should work quite as well as that from Manchuria. Any of these organizations will have someone who can handle correspondence in English.

In each case, he should offer to exchange grain amaranth seed - preferably the best he has for grain purposes - since it is not likely to be for sale here, and since a purchase would mean that he would have to go through the State Trading Corporation, which would be more trouble than it would be worth.

Sincerely,

George Bush
Chief, United States Liaison Office

ECON:WWThomas:nbg

From the desk of

GEORGE BUSH

ECON - Mr. Thomas

Bill, any thoughts on this?

James Pierce is Barbara's brother.

GB

9-25-75

Outdoor Life

380 MADISON AVENUE, NEW YORK, N.Y. 10017, TELEPHONE: (212) 687-3000

JAMES R. PIERCE

ASSISTANT TO THE
PUBLISHER

September 5, 1975

Ambassador George H.W. Bush
Peking
c/o Department of State
Washington, D.C. 20520

SEP 15 1975

Dear George:

Enclosed is the self explanatory volume I
talked about on the phone, and a letter from
Bob Rodale.

It appears to be a well worthwhile project
and hopefully some chinese official in Peking
and not up in the Northeast corner will have a
handful of amaranth grains.

Anything you can do -- great.

Good to talk to you.

Best --

Jim

*Bob's
brother*

RODALE PRESS

INC., ORGANIC PARK • EMMAUS, PENNA. 18049

August 14, 1975

Mr. James R. Pierce
Assistant to the Publisher
OUTDOOR LIFE
380 Madison Avenue
New York, New York 10017

Dear Jim:

I enjoyed our conversation yesterday about China. Also, since talking to you, I thought about a problem that you might be able to help me with, through your sister.

We have been working on a research project for the past two years centered around popularizing certain semi-wild plants which were important food sources for primitive people, and which have great potential now, especially for use in home gardens. Rather than explain this project at length in this letter, I am enclosing a clipping of the recent article from ORGANIC GARDENING AND FARMING entitled "New Crops for America" which tells the story quite well.

I am asking your help to try to obtain the seeds of one of these plants, the grain amaranth, that is grown in China. We have been able to obtain the seeds from Mexico and have grown the plants successfully for the past two years. However, this plant is quite susceptible to the length of day and night in the latitude in which it is grown. In other words, in Mexico the days and nights are more or less of equal length, and the grain amaranth growing there are adapted to that condition. When we grow Mexican amaranth in Pennsylvania, they don't get the same light-dark cycle, and therefore do not flower as well.

By doing literature research on the grain amaranth we have found that they are grown in Manchuria. I would love to be able to get a sample of the seed of Manchurian amaranth grain, as the light-dark cycle there is much more comparable to our own than it is in Mexico. We have tried all avenues to get these seed samples through American experts, including an appeal to the Chief of Plant Introduction of the U. S. Department of Agriculture who had been to China recently. We have been totally unsuccessful so far, because American agricultural experts do not think of the grain amaranth as a food plant. The U. S. D. A. man I mentioned was totally unaware of it and could offer no suggestion as to a means to get the seed.

James R. Pierce
Assistant to the Publisher
Outdoor Life

-2-

August 14, 1975

I thought that perhaps your sister might have some contacts among the Chinese agricultural authorities and could get us a seed sample for planting next year.

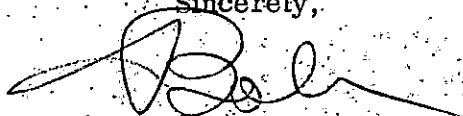
One more point. There are two kinds of amaranths that are generally used for food. One produces small black seeds, and those seeds are not eaten. That kind of amaranth is just used to produce edible leaves, which are a pot herb. The plant we are after produce small white seeds, which are edible and are an excellent source of high quality protein. The leaves of the white-seeded type are also edible.

To sum up, what I would really like to get is a few ounces of white seed from the grain amaranth grown in Manchuria. I would also love to get some photos of the plant growing in China, but I don't want to ask for too many things at one time.

Thanks in advance for any help you can give me on this project, which could result in improving the quantity and quality of the American food supply.

Best regards.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Bob', with a long horizontal flourish extending to the right.

Robert Rodale,
President

RR/jan

New Crops for America?

The Rodale Press Research and Development Group takes a close look at some little-known plants that could become important foods of the future.

BRENDA BORTZ

ARE THERE "FORGOTTEN FOODS" that could become valuable new crops? To find the answer to this intriguing question, ORGANIC GARDENING AND FARMING's Research and Development Group is now evaluating a grain and leaf crop that fed pre-historic Europe and another that became the sacred food of the Aztec Empire.

R & D's commitment to these fascinating plants began with a letter received in June, 1973 from Dr. John Robson, an M.D. directing the Human Nutrition Program at the University of Michigan. Robson had spent years working in the less-developed countries, and he was convinced that some of the half-wild plants under limited cultivation in these areas were rich sources of vegetable protein, food energy and fiber.

Would Rodale Press, he asked, be interested in helping to establish and publicize the nutritional value of these little-known species? The answer was an emphatic "Yes!" Moreover, since OGF wanted to seek out foods Americans could grow themselves, a prompt decision was made. The project would focus on species that offered both superior nutrition and the likelihood of growing successfully in the U.S. without the long delay and tremendous expense of a breeding program.

With palatability and safety as additional screening criteria, ethnobotanist Joel Elias started searching the literature. Before long, two related plant groups began to stand out as

best bets for in-depth nutritional and agronomic evaluation.

The first was genus *Chenopodium*—a plant group long used by man in both the Old and New Worlds, where carbonized seeds have been found in hearth and refuse pits uncovered by archeologists. According to one European authority, reported Joel, chenopodium seeds were an important cereal-like food in pre-historic Europe. However, the influx of wheat, rye and other domesticated cereals from the Near East evidently kept the plant from evolving into a primary food source.

Nevertheless, species of *Chenopodium* persisted through the centuries. In industrialized societies such as the U.S., the plant remained wild—valued by some as a free source of tender young leaves. (For example, the widely-eaten "weed" known as lamb's quarters, or goosefoot, is *Chenopodium album*.)

But such native wild species were not nearly as interesting as the chenopods under cultivation in the more primitive parts of Peru, Bolivia and Mexico. Grown for hundreds of years as "back-up crops" for corn, such species seemed likely to offer higher seed yields. The seed heads of these cultivated chenopods were also reported less likely to shatter before harvesting.

Excited by this much of the chenopod story, in spring, 1974, we managed to obtain a 5-gram sample from a USDA researcher in Illinois. By late

but he said no — there were none.

There are other areas somewhat tangential to gardening. For instance, we learned of one strange case where a group had inquired into the growing of alfalfa sprouts in their basement. They proposed to grow sprouts and then sell them to a natural foods store. To their chagrin, they were told growing the sprouts for such sale would be classified as food processing. And thus in growing the sprouts they not only would violate the health requirements for food processing, but also the zoning regulations. But when we pressed this matter with a health official, he insisted that the actual growing of sprouts was not a violation of the law.

Take the example of someone who wants to bake a few loaves of bread in the home kitchen, and then sell them to neighbors on the block. The health department told us this was completely illegal. To sell bread, you need a license, and to obtain a license you must be in a section that is zoned for commercial activity, and even then, you must meet the plumbing codes. They include: three different sinks, one for utensils, one for mops, one for cleaning up; separate bathrooms for male and female; special exhaust systems for the ovens; a utility room; certain kinds of steel legs on the baking table, and so on.

In the District of Columbia the problem is that all these areas are interpreted in a fairly vague manner. You might well be able to get away with selling strawberries grown in your backyard once or twice. And quite possibly you could sell bread on the block. But if ever there were any questions raised, you would seemingly have little real legal defense, and more to the point, you would be overwhelmed by the labyrinthine bureaucracy that would descend.

Rules affecting gardening differ from place to place. For example, just across the Potomac River in Alexan-

dria, there are ordinances against keeping fowls, and rodent ordinances which place restrictions on compost piles. But there is no regulation against beekeeping.

In Montgomery County, which is next door to Washington in Maryland, there are regulations requiring that bees be kept 100 feet from dwellings. You can keep pigs, but they must be one-quarter of a mile from the public thoroughfare and a half mile from a neighboring residence. Chicken coops must be 100 feet away from the house and 100 feet away from the neighbors.

Officials in Montgomery County encourage composting of grass clippings and leaves, but discourage composting of vegetable matter for fear of rats. To attack compost piles which contain vegetable matter, officials use a rat-feeding ordinance which allows the public health people to come in and remove the "food." If that doesn't work, they can cite a sanitary landfill law which stipulates that there must be 18 inches of compact earth over garbage.

In Alexandria, the zoning laws are much the same as in Washington: It is illegal to sell anything raised on residential property. But in Montgomery County — part of which is rural, part urban — you can sell vegetables from plots of up to one-half acre, although it is illegal to sell from lots bigger than that. Officials admitted they were mystified at why there was a distinction between one half acre and one acre.

The area where you live may or may not be as complex and restrictive as the Washington area's zoning ordinances, but it's hard to tell. To be on the safe side, it is advisable to check out the public health regulations, especially as they may apply to compost piles. If you intend to sell what you grow to a store, a co-op, etc., be doubly sure to check out public health regulations and zoning.

summer, more seed had arrived from Peru—flown out in a diplomatic pouch.

Samples of two chenopodium species from Mexico also came in June. These were hand-carried by Joel Elias, who had spent two weeks tracking them down. He was also able to find and bring back seeds from the other plant targeted by R & D.

This was genus *Amaranthus*. The species under cultivation in central Mexico was a white-seeded relative of the ornamental and wild amaranths growing in the U.S. On paper, it looked extremely promising as a rugged, high-yielding grain crop.

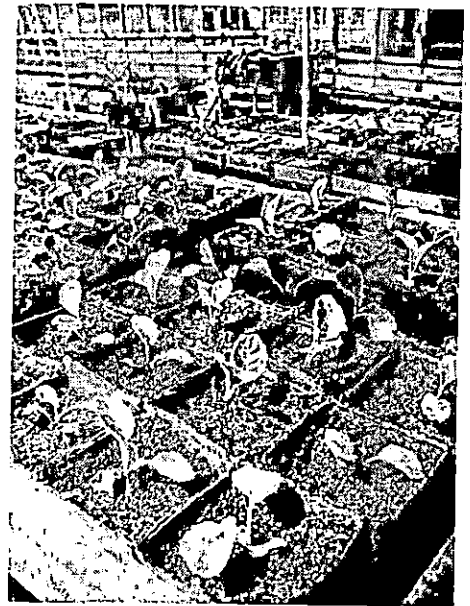
The plant has a colorful past. Growing to 6-foot splendor with large, magenta-tinged leaves, this strain of amaranth had been domesticated by the Aztecs well before the Spanish Conquest. When Cortes arrived in 1519, the majestic amaranth was an important part of Aztec economic and cultural life.

Montezuma received 200,000 bushels a year in tribute, and the valued grain played a major role in the Indians' religious festivals. Mixed with honey—and sometimes with human blood—the seeds were kneaded into a paste called "zoale." This was shaped into idols that were paraded through the streets, then broken and eaten by the celebrants. A version of zoale was also fed in soup to slaves about to be sacrificed.

Interestingly, with the arrival of the Spaniards and Christianity, amaranth began to decline in importance. Because the food was so closely linked to pagan rituals, the Spanish authorities discouraged its cultivation. Nevertheless, it continued as a minor crop of varying local importance. In Mexico today the grain is mostly popped and mixed with honey to make a popular candy mildly reminiscent of zoale.

But although the dramatic amaranth and its chenopod relatives clearly had

July, 1975



Numerous samples of amaranth and chenopodium seed collected in Mexico, India, Peru and Bolivia got off to a strong indoor start this spring. Several plants from each group were transferred to transparent pots for greenhouse studies on growth and flowering.

new crop potential, there were very basic unknowns. Given a different light/dark cycle, could the seeds from Mexico and Peru develop into mature plants that would themselves set seed? Equally important, would nutritional analyses of the samples confirm the rather sketchy data in the literature on protein quantity and quality?

In the first growth trial at the Experimental Farm last spring, the amaranth matured magnificently. Some plants topped six feet, and most important, all set seeds. The yield, though, was much lower than the available figures for Mexico. The Mexican chenopods did not fare as well; one species failed to germinate, while the other grew to a stunted height and set only a few seeds. The chenopod seeds from Peru likewise produced small, skimpy plants bearing less than a handful of seeds.

Given the late planting date and an unusually early frost, these first results

were reasonably encouraging. The nutritional report received in February, 1975, was even more positive. The seed samples of amaranth and the Peruvian and Mexican chenopods had a protein content ranging from 14.6 to 18.2 percent (compared to 14 percent for top-grade, wholegrain wheat).

Just as important, the quality of the protein in these little-known grains was first rate. Amino acid analysis showed that the "forgotten foods" were high in components of protein that are found in much lesser amounts in now common sources of vegetable protein. In practical terms, this means that a small amount of amaranth or chenopodium seed mixed with wheat, corn and/or beans can offer protein as complete as that found in meat or eggs.

Just how much of this plant protein can be digested and retained is another question — one that will be answered by animal growth trials later in 1975. Meanwhile, the second sum-

mer of agronomic research is well under way, directed by OGF's agronomist, Dr. Alex Cunard. By late fall, Research and Development will have precise data on seed and dry matter yields — not only from the New Experimental Farm, but from approximately 300 sites around the country where OGF reader/researchers are doing growth trials.

If yields and fertilizer requirements prove acceptable, the project will be moving from the garden to the kitchen this fall and winter. Fitness House nutritionist Anita Hirsch tentatively plans to test traditional recipes featuring grain or greens from these almost-forgotten plants. She will also be developing dishes that combine the new flours with other non-meat protein foods for maximum protein value and taste appeal. After all, if these forgotten foods prove worth remembering, the gardeners who grow them will want to top off their great adventure with some good eating!

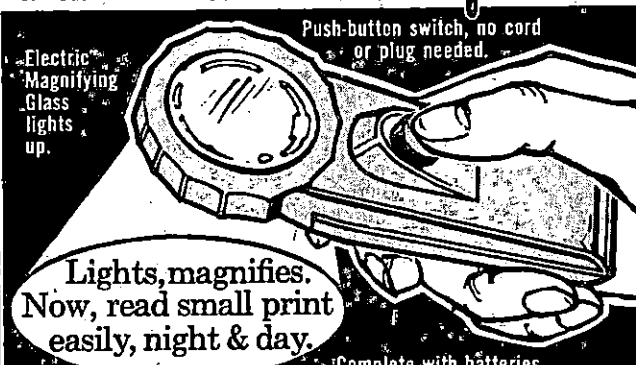
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Page 117 shows
location of amaranths
in Manchuria

Reprinted from
AMERICAN ANTIQUITY
Volume 34, Number 1, January 1969

IDENTITY OF ARCHAEOLOGIC GRAIN AMARANTHS FROM THE VALLEY OF TEHUACAN, PUEBLA, MEXICO

JONATHAN D. SAUER

ABSTRACT

Coxcatlán Cave has yielded the earliest records of two domesticated species still grown as minor grain crops in Mexico. *Amaranthus cruentus*, previously unknown archaeologically, is tentatively identified from a level dated at about 4000 B.C. and positively identified from six levels dated between about 2500 B.C. and the time of the Conquest. *Amaranthus hypochondriacus* was found at two levels dated about A.D. 500. There is no evidence that either species was domesticated locally.

CHRONICLES and codices show that amaranths were widely cultivated in Mexico at the time of the Conquest as major food and ceremonial grains (Sauer 1950). Subsequent collections of the crop, scattered as a relic in Indian agriculture from Arizona to Guatemala, show that two species are involved: *Amaranthus cruentus* L. and *A. hypochondriacus* L. (*A. leucocarpus* S. Wats. is a synonym of the latter.) They were evidently domesticated from two closely related wild species, *A. hybridus* L. and *A. powellii* S. Wats., respectively, from which they diverge

in seed color and other characters attributable to human selection. Although ancient domestication in Mesoamerica was inferred, there was no direct evidence of antiquity of either species in Mexico at the time the record was last surveyed (Sauer 1967). In fact, the only identified archaeological specimens of either species were from Arizona cliff dwellings, where *A. hypochondriacus* had been found in 14th-century levels (Bohrer 1962: 107-9).

Much earlier records are now available from specimens excavated by the Tehuacán project of the R. S. Peabody Foundation for Archaeology, directed by R. S. MacNeish. Specimens deposited in the Instituto Nacional de Antropología e Historia, Mexico, that had been tentatively assigned to *Amaranthus* by E. O. Callen and C. Earle Smith, Jr., were sent to me for further study. The material consists mainly of fragments of inflorescences, some in bundles, evidently brought into the cave for threshing. The flowers and ripe seeds are perfectly preserved, and the species can be determined as readily as if the material were fresh.

Amaranthus cruentus is represented by 13 finds, all from Coxcatlán Cave. The earliest is from the upper Abejas phase (about 3500 to 2300 B.C.) in zone VIII. Others are from Santa María phase (about 900 to 200 B.C.) in zone VII, the upper Palo Blanco phase (about 200 B.C. to A.D. 700) in zones IV and V, and the Venta Salada phase (about A.D. 700 to 1540) in zones II and III. All of these are very close to typical modern *A. cruentus* in diagnostic characters, except that several plants from zones IV and V show individual variations in shape of flower parts, evidently due to hybridization with *A. hypochondriacus*. Typical *A. hypochondriacus* is represented by other specimens from zones IV and V in the same cave.

Unidentified amaranths have been reported in earlier, incipient agricultural levels of Coxcatlán Cave (MacNeish 1964: 534; Callen 1965: 338), but no specimens can now be located in the Instituto Nacional. Fortunately, Callen has a sample of 15 seeds that he had mounted on a microscope slide for study; these are out of a packet from the Coxcatlán phase (about 4000 B.C.) in zone XII. They clearly represent a domesticated grain amaranth, probably *A. cruentus*, although without flower parts it is impossible to rule out the possibility that they are from *A. hypochondriacus*.

All the Coxcatlán Cave amaranths have pale, ivory-colored seeds, a peculiarity of amaranths cultivated as grain crops and subject to careful selection for seed color. Dark brown seeds are universal among modern races of *A. cruentus* and *A. hypochondriacus* grown as dye plants, potherbs, and ornamentals, and among all weed and wild amaranth species.

The probable wild progenitors of the grain species have very wide ranges in temperate and tropical America. Although not members of the semidesert scrub vegetation of the Tehuacán region, they might have been present in the valley in aboriginal times as streambank pioneers or weeds of irrigated fields. However, the only wild amaranth material found in the Tehuacán excavations is an

undated inflorescence from San Marcos Cave of *A. pulmeri* S. Wats., a species not closely related to the domesticates. Since the Coxcatlán Cave specimens do not show transitional stages from the wild, local domestication seems unlikely.

Use of the grain for ceremonial or minor food purposes rather than as a staple is suggested by the small quantity found in Coxcatlán Cave as compared to true cereals, a species of *Setaria* or foxtail millet in earlier and maize in later levels (Smith 1965: 332-3; Callen 1965: 338-41; 1967: 536).

The Tehuacán Valley lies within the general area where ancient grain amaranth cultivation was inferred from historic and modern distributions (Sauer 1950: 572-80; 1967: 112). Being in an unsubjected enclave within the Aztec Empire, it could not have been recorded as a source of amaranth grain in Moctezuma's tribute lists, as were some other parts of Puebla. However, in 1581 the grain, *huauhtli*, was listed among the crops at nearby Guauhltla, presumably giving that place its name. Cakes of popped amaranth grain are still common in the Tehuacán city market (Whitaker and Cutler 1966: 11). Flower parts of *A. cruentus* are recognizable in one of these cakes that Callen bought from a Tehuacán street vendor in 1963.

Acknowledgments. For making specimens and data available, I am indebted to Prof. E. O. Callen, Macdonald College of McGill University; Dr. C. Earle Smith, Jr., Crops Research Division, U.S. Department of Agriculture; Prof. José Luis Lorenzo and Biol. Lauro González Quintero, Departamento de Prehistoria, Instituto Nacional de Antropología e Historia, Mexico.

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UNIVERSITY OF CALIFORNIA
Los Angeles, California
January, 1968

THE GRAIN AMARANTHS AND THEIR RELATIVES: A REVISED TAXONOMIC AND GEOGRAPHIC SURVEY

BY JONATHAN D. SAUER¹

Professor of Geography, University of California, Los Angeles

Much new information on this species group has accumulated in the years since my initial survey was carried out in the graduate laboratory of the Henry Shaw School of Botany (Sauer, 1950a). Many people have volunteered original field observations and collections from various places in Latin America, Asia, and Africa. Archaeologists have turned up the first material evidence of pre-Columbian grain amaranth cultivation in North America (Bohrer, 1962). Gradually, incidental to other work, I have had chances to study historically important collections in major European herbaria. Experimental plantings have answered some questions about variation patterns. Several long-standing taxonomic problems can now be resolved, classification simplified, and nomenclature corrected.

To make the revised presentation intelligible by itself, some information will be reviewed briefly, but without repeating details or documentation. The previous survey should be consulted for historical geography of the grain crop and for descriptions, illustrations, and lists of exsiccatae of all the species. Sources will be cited for all newly presented information. Specimen citations for the new maps of the grain crop are given in the Appendix.

In both text and Appendix, references to specimens are accompanied by notations of herbaria in which they are deposited, according to the Index Herbariorum of the International Association for Plant Taxonomy.

THE GENUS *AMARANTHUS* IN RELATION TO MAN

Amaranths were widely distributed through the world's temperate and tropical regions even before man converted some of them into cosmopolitan weeds and domesticates. About 60 species were native to the Americas and a total of about 15 others to Europe, Asia, Africa, and Australia. Most were pioneer annuals of naturally open habitats: mountain and desert canyons, riverbanks, lakeshores, tidal marshes, and ocean beaches. Producing abundant seed that is widely dispersed by water and birds, they survived by constant colonization of sites with

¹I am indebted to all the people referred to in the text who supplied unpublished information, photographs, and new collections. Many of these contributions were inspired by Edgar Anderson and were relayed through the Missouri Botanical Garden. A special Guggenheim Foundation grant to Professor Anderson made possible massive experimental plantings, conducted by George Freytag at the Escuela Agrícola Panamericana, Zamorano, Honduras; these provided adequate population samples grown under uniform and favorable conditions. I am also indebted to the curators of the herbaria and museums cited for making their indispensable collections available for study. Varsila Bohrer and Joel Andress supplied useful ideas and leads to sources of which I was unaware. The maps were prepared by Jeanne Tsou Liu in the University of Wisconsin Cartographic Laboratory, under the direction of Randall Sale.

ANN. MISSOURI BOT. GARD. 54(2): 103-137, 1967.

disturbed soil, full sun, and little competition. Long natural selection for such a way of life preadapted certain of the species for success in habitats drastically disturbed by man.

The beginnings of their association with man may be cryptically recorded in pollen deposits, but palynology can not yet discriminate amaranth pollen from that of related plants. Even before the origins of agriculture, some amaranths must have flourished around camps and fishing villages. Prehistoric peoples undoubtedly used these conveniently available volunteers in several ways.

Any amaranth seeds, so far as is known, are quite edible when simply toasted and milled, tasting much like true cereals. Analyses and nutrition experiments show the grain to be comparable to true cereals as carbohydrate food and superior in protein and fat content (Hunziker, 1952, p. 78; Singh, 1961, pp. 3-5). Though the seeds average only about 1 mm in diameter, they are obtainable in prodigious quantities, even by primitive gathering techniques (Jones, 1953, p. 90). There are innumerable historical and ethnographic accounts of such gatherings in many regions. Archaeologic amaranth seeds, often in massive caches, are associated with such diverse cultures as Lake Dweller in southern Europe (Thellung, 1914, p. 327), Hopewellian in the Illinois Valley (Struve, 1964, p. 102), Basketmaker in Colorado (Jones & Fanner, 1954, p. 94), a pre-ceramic old duné hearth in New Mexico (Agogino & Feinhandler, 1957, pp. 154-155; Agogino & Hester, 1958, p. 187), and incipient agricultural levels in Tamaulipas and Puebla caves (Kaplan & MacNeish, 1960, p. 36; MacNeish, 1964, p. 534). The species involved are not known, but it seems likely that whatever amaranths were locally available were gathered indiscriminately. Domestication of selected species as grain crops was concentrated in definite regions of the New World, as will be shown below.

Young amaranth leaves and shoots are boiled as greens or potherbs in much of the world. Generally, volunteer weeds are gathered with little discrimination as to species. Careful selection as potherbs leading to domestication evidently took place only in Asia. A variety of cultivated races assigned to *Amaranthus lividus* L. and *A. tricolor* L. (both s.l.) are common potherbs of eastern and southern Asia; these have been introduced to the western world under such names as Chinese spinach, Malabar spinach, and *tampala*, the generic name for amaranths in Ceylon. The American grain amaranths make good potherbs and one is now widely planted as such in the Old World. In their native regions, thinnings from the grain crops are often salvaged as boiled greens but they do not seem to be planted for that reason nor even preferred to their weedy relatives.

Many wild amaranth species have quite noticeable and variable red coloration of inflorescences, leaves, and stems, due to an anthocyanin of the type found in beets. Such pigmentation is intensified in certain forms of all the domesticated grain and potherb species. Selected deep red forms, closely related to some of those grown for grain, are widely scattered as ceremonial, magical, and simply ornamental plants.

Although many amaranths have some role in culture history, a few New World species stand out as especially significant. These belong to a single section (*Amaranthus*) of the genus, with which the rest of this paper is solely concerned.

CHARACTERISTICS OF AMARANTHUS SECT. AMARANTHIUS

This section includes all the domesticated grain and dye amaranths, most of the domesticated ornamentals, and most of the common weeds. It has long been recognized as a section under the name *Amarantholypus* Dumort (Thellung, 1914, p. 230; Sauer, 1950a, p. 594; Grant, 1959b, p. 319; Aellen, 1961, p. 467). Under the present rules of nomenclature, it must bear the same name as the genus, since it includes the type species, *A. caudatus* L. Members of the section form a coherent group, perhaps close to the primitive core from which other sections of the genus radiated.

The section is distinguished from the bulk of the genus by the following combination of characters: plants monoecious; cymes continuing above uppermost leaves to form large, compound terminal inflorescences; tepals and stamens 5 (or varying between 3-5 in flowers of the same plant); utricle circumscissile (indehiscent in occasional mutant and hybrid individuals). As a rule these characters are extremely constant (the parenthetically noted variants are mainly within one species, *A. powellii*.)

Some of the sectional characters are clearly connected with the success of its members as grain crops: the monoecious habit, the dehiscent utricle allowing easy threshing and winnowing, and the large compound inflorescences producing enormous quantities of seed. Estimates of seed production of individual plants in this group have usually been on the order of several tens of thousands, but yields of over 500,000 seeds from a single plant of *A. retroflexus* have been reported (Priszter, 1950, p. 81).

Within the section, discontinuities between species are, as a rule, quite clear-cut. The group has an undeserved reputation of being taxonomically difficult, mainly because of hopeless attempts to recognize taxa by pigmentation, which segregates within populations, and by growth form, which is extremely plastic under different day lengths and other environmental variables. There are abundant constant characters, particularly in shapes and proportions of pistillate flower parts, whose correlated discontinuities reveal genetically isolated species.

However, breeding barriers between the species are by no means always absolute, even when species have different chromosome numbers². An imposing array of hybrids, involving most of the members of this section, have been reported in the literature, recently reviewed by Grant (1959b, p. 321) and Aellen (1961, pp. 512-514). The importance of these hybrids can easily be exaggerated because many are sterile or rapidly eliminated by natural selection. However, some weedy and cultivated populations have variation patterns suggesting effective introgression; these will be noted under the species involved.

²Chromosome counts have so far been of little help in amaranth taxonomy, except in the polyploid *A. dubius* (Grant, 1959a, p. 1064). Diploid numbers of 32 or 34 have been found in all the many other species studied (Grant, 1959b, pp. 315-319). Both counts have sometimes been reported for the same species and the difference shows no apparent connection with relationship or crossability.

- a. Bract much shorter than tepals. *A. brandegei*
- b. Tepals acute, shorter than utricle
- bb. Tepals obtuse or retuse, longer than utricle. *A. celosoides*
- c. Tepals retuse
- cc. Tepals obtuse
- aa. Bract equalling or exceeding tepals.
- b. Tips of tepals incurved against utricle; bract and all tepals approximately equal in length. *A. spinosus*
- c. Lower cymes pistillate, upper staminate; spines in leaf axils
- cc. Each cyme with initial staminate flower and remainder pistillate; plants unarmed
- bb. Tips of tepals straight or spreading away from utricle; inner tepals definitely shorter than outer tepals and bract. *A. dubius*
- c. Utricle much shorter than tepals; seed less than 1 mm in diameter.
- d. Inflorescence very large, much branched; outer tepals obovate
- dd. Inflorescence small, unbranched; outer tepals spatulate
- cc. Utricle equalling or exceeding some or all tepals; seed at least 1 mm in diameter.
- d. Inflorescence short, unbranched; style-branches longer than utricle
- dd. Inflorescence large, branched; style-branches shorter than utricle.
- e. Inflorescence branches short and thick; tepals all retuse or obtuse
- cc. Inflorescence branches long or sleniger or both; outer tepals acute or acuminate. *A. retroflexus*
- f. Fully developed inflorescence moderately large; bract exceeding style-branches; seed dark brown (PROGENITORS OF THE DOMESTICATED SPECIES—coarse, weedy plants, generally green with dull red pigmentation).
- g. Inflorescence stiff, with few branches; bract about 5 mm long, with extremely heavy midrib; style-branches thick at base; tepals and stamens 3 to 5
- gg. Inflorescence lax, usually with many branches; bract 3 to 4 mm long, with moderately heavy midrib; style-branches slender at base; tepals and stamens 5. *A. powellii*
- h. Tepals straight, the inner oblong, acute
- hh. Tepals recurved, the inner spatulate, obtuse
- ff. Fully developed inflorescence enormous; bract not exceeding style-branches; seed dark brown or pale ivory, often tinged with red in *A. caudatus* (DOMESTICATED SPECIES—attractive, cultivated plants, generally bright green or intense red or various striking combinations).
- g. Inflorescence stiff; bract equalling style-branches, with moderately heavy midrib; style-branches thick at base
- gg. Inflorescence lax; bract not exceeding utricle, with slender midrib; style-branches slender at base. *A. hypochondriacus*
- h. Tepals straight, the inner oblong, acutish; style-branches erect
- hh. Tepals recurved, the inner spatulate, obtuse or emarginate; style-branches spreading

A. caudatus

WILD SPECIES

Of the 12 wild species listed in the key, the first nine will be passed over briefly; their taxonomy has remained comparatively unconfused and they are not believed to be directly related to the grain species.

Amaranthus brandegei Standley, *A. bigelovii* Uline & Bray, and *A. viscidulus* Greene are minor, non-weedy endemics of the southwestern U.S. and northwestern Mexico.

Amaranthus scariosus Benth. is common and weedy in southern Mexico and Central America, but has not emigrated to other regions.

Amaranthus celosioides H.B.K. has been found at scattered places in western South America from Venezuela and Colombia to Chile, on the Galapagos, and on San Lorenzo Island off Peru. Specimens are few and rather heterogeneous.

Amaranthus pallidiflorus F. Muell. is the only member of the section native to the Old World. It is known only in Australia, except for ephemeral adventives introduced with Australian wool. I have seen it in quite natural habitats on the coastal dunes of Western Australia. The least incredible origin would seem to be by ancient, long range dispersal from South America².

Amaranthus spinosus L. and *A. dubius* Mart. ex Thell. are the commonest and most widespread weedy amaranths of the New World tropical lowlands, where they presumably originated. *Amaranthus dubius*, the only known polyploid amaranth species, is probably an allotetraploid to which *A. spinosus* contributed one chromosome set (Grant, 1959a, p. 1068); the other progenitor is evidently either *A. quitensis* or *A. hybridus*. By 1700, *A. spinosus* was spreading rapidly through the warmer parts of the world, both as a weed and as a sporadically planted pot-herb. *Amaranthus dubius* followed more slowly, being found at only a few places in the Old World before 1800; it has not spread as widely as *A. spinosus* outside the tropics. Sterile hybrids between the two are common, and have elicited some Latin names, e.g. *A. caracasanus* H.B.K.

Amaranthus retroflexus L. is a native riverbank pioneer of the central and eastern U.S. and adjacent regions of southeastern Canada and northeastern Mexico. In much of this area it has become one of the commonest of all agricultural weeds and thus is often mistaken for an exotic. Peter Kalm sent seeds from Pennsylvania to Linnaeus; the progeny grown at Uppsala, some of which are preserved (LINN 1117.22), may have been the first in Europe. Thellung (1914, p. 258) blamed Linnaeus for inoculating Europe with the species by disseminating it to botanical gardens. By 1800, it was becoming a common weed through much of the continent (Priszter, 1951, p. 261) and soon after spread into the Near East and North Africa. It has since become naturalized throughout temperate regions of the northern and southern hemispheres. In areas of overlap with *A. powellii* and *A. hybridus*, *A. retroflexus* forms many partially sterile hybrids, especially in weed populations of highly artificial habitats.

²A similar enigmatic disjunction occurs between South American and Australian coastal populations of *Carpobrotus* (*Mesembryanthemum*).

The other three wild species will be considered in more detail, as they appear to be directly related to the domesticated grain species. Their taxonomy and nomenclature have been appallingly confused, mainly by attempts to classify continuous intraspecific variations. Synonymy will be limited to basionyms of recently used names.

AMARANTHUS POWELLII S. Wats., Proc. Amer. Acad. 10: 347, 1875.

Type: United States, grown at Harvard Univ, 1874, seed obtained from Arizona Indians by Powell s.n., US 16163; isotype MO.

A. chlorostachys Willd. var. *pseudoretroflexus* Thell., Vierteljahrsschr. Naturf. Ges. Zürich 52: 443, 1907.

Type: Switzerland, Derendinger, Solothurn, by worsted yarn factory, 1907, Probst s.n. (not seen, but Thellung's description is diagnostic).

A. bouchoni Thell., Monde des Plantes, sér. 3, 45(160): 4, 1926.

Type: France, Bordeaux, trash dumps by harbor, 25 Sept. 1925, Bouchon s.n., fragment US (Thellung published simultaneously an alternative name *A. hybridus* subsp. *hypochondriacus* var. *chlorostachys* subvar. *genuinus* f. *bouchoni*).

Amaranthus powellii is a pioneer of canyons, desert washes, and other open habitats, ranging through the western Cordilleran system of North and South America, with wide gaps in the wetter regions of Central America. The species has long been a common weed in the West. It began appearing as a rare adventive in eastern North America about 1900; since 1940 it has become a widespread and troublesome weed there. The species also arrived in Germany as an adventive shortly before 1900 and has since become an abundant and still expanding weed of northern and central Europe, where it is usually misidentified as *A. chlorostachys* Willd., a synonym of *A. hybridus*. It has also recently invaded southern India and South Africa.

The species is exceptional in producing flowers with tepal and stamen numbers varying from 3 to 5, even on a single plant. Also, individual plants with indehiscent utricles occur sporadically in native American populations and have formed whole local populations in Europe (Brenan, 1961, p. 270; Aellen, 1961, p. 475), where they have elicited the name of *A. bouchoni*. Such aberrant forms are common among hybrids between other species of *Amaranthus*, but in *A. powellii* they evidently arise without hybridization. The species is involved in partially fertile hybrid swarms in eastern North America, where it is invading territory of *A. retroflexus* and *A. hybridus*, in western North America where the converse is true, and in Europe, where all three are recent immigrants. It also crosses locally with the domesticated grain species, as noted below.

AMARANTHUS HYBRIDUS L., Sp. Pl. 990, 1753.

Linnaeus' phrase-name, *A. racemis pentandris cylindricis horizontalibus, caule inermi*, and the geographic source, Virginia, are appropriate but inconclusive. He also gave two synonyms: (1) *A. sylvestris maximus novae angliae, spicis viridibus*, attributed to John Ray (1686-88, 1: 201), but Ray's name ended

with . . . *spicis purpureis, carneis, aut viridibus*, and Linnaeus was actually following Tournelort (1719, 1: 235) in dividing Ray's species into three according to inflorescence color; (2) *A. major, virentibus spicarum paniculis, semine nigro* Barr. (Barrelier, 1714, fig. 648). Barrelier's drawing is a fair likeness of the species and all the material available for typification agrees: a specimen bearing Tournelort's polynomial in the Hortus Cliffortianus herbarium (BM), a Clayton specimen from Virginia bearing the same name in the Gronovius herbarium (BM), a specimen labelled *A. hybridus* from the Uppsala Botanic Garden (LINN 1117.19).

A. chlorostachys Willd., Hist. Amaranth. 34, tab. 10, fig. 19, 1790.

The only specimen labelled *A. chlorostachys* in the Willdenow herbarium is a collection by *Hermes B* 17521. It agrees well with the (ambiguous) description and plate.

A. patulus Bertol., Comment. It. Neap. 19, tab. 2, 1837.

Based on plants found by Bertolini in the plain of Pascone, nr Naples, Italy, which are not known to have been preserved.

A. incurvatus Tim. ex Gren & Godr., Prosp. Fl. France 8, 1846.

Type: France, Tigneu nr Lyon, *Timeroy* s.n. (not seen, but original description fairly diagnostic).

Amaranthus hybridus is evidently a native riverbank pioneer of milder and moister regions from eastern North America through Mexico and Central America to northernmost South America. It has long been a common field weed in this region. Its earliest and most successful emigration was to the Mediterranean region, where it arrived by the early 18th century and became abundant during the 19th century. The species has appeared repeatedly but ephemerally in northern Europe. It has recently become a naturalized weed in western North America, eastern Asia, Australia, and South Africa. At home and abroad, wherever weed populations of *A. hybridus*, *A. powellii*, and *A. retroflexus* mix, partially fertile hybrids appear. Hybrids with the domesticated *A. hypochondriacus* and *A. cruentus* are discussed below.

AMARANTHUS QUITENSIS H.B.K., Nov. Gen. Spe. Pl. 2: 194, 1817.

Type: Ecuador, banks of Río Guallabamba, alt ca 2000 m, June 1802, *Humboldt & Bonpland* 156 (not seen, but the original description is diagnostic).

Amaranthus quitensis is evidently a native riverbank pioneer of South America, both in the mountains of the northwest and at lower elevations in the temperate south. It is also present in the Galapagos, perhaps naturally. Throughout much of South America, the species has become the commonest weed amaranth. It is not known to be naturalized elsewhere, although it has appeared repeatedly in Europe since the late 19th century as an ephemeral adventive, especially around ports and woolen mills.

Forms of this species with stout, intensely red inflorescences grow in Andean gardens and maize fields from Ecuador to northwest Argentina. Called *ataco* or *sangorache*, the plants are semi-cultivated or tolerated as volunteers useful in

coloring *chicha* and ceremonial maize dishes (Sauer, 1950b, p. 412; Heiser, 1964, pp. 137-139). It is not known whether such use is ancient; the earliest available collections are modern (e.g. Peru, Torontay, *jataco achiuite*, 1915, Cook & Gilbert 1893, US; Ecuador, nr Huigra, *ataco, sangorache*, 1918, Rose 22145, US). In aspect the plants look suspiciously like domesticates such as *A. cruentus*, which is used to color ceremonial maize bread in North America. However, if these plants are derived from hybrids between domesticated and weedy amaranths, backcrossing to the weedy *A. quitensis* has obliterated any clearly diagnostic characters of the other species. Another possibility is that the plants are pure *A. quitensis* in a stage of incipient domestication.

DOMESTICATED SPECIES

The three grain species diverge from their closest wild relatives in several similar ways. Bracts are relatively short and weak, perhaps because of selection favoring inflorescences that are less prickly when rubbed between the hands, a common method of extracting the grain. Plants and inflorescences are extremely large, giving greater grain yield with little or no increase in seed size. Pale ivory seeds, preferred for popping quality and flavor, predominate in the grain crops of all three species. The wild type dark brown seeds, characteristic of all other amaranths, are produced by some plants in most grain crops. In the absence of constant artificial elimination, the dark seed type may have the advantage, judging from its frequency among feral plants and those cultivated for non-grain purposes.

The nomenclature of these three fairly coherent and discrete species has been complicated by giving different Latin names to some of the more conspicuous variants that constantly appear within each population and then multiplying these names by shifting them up and down the taxonomic hierarchy. Only partial synonymy will be given, emphasizing basionyms of commonly used names.

AMARANTHUS HYPOCHONDRIACUS L., Sp. Pl. 991, 1753.

The phrase-name, *A. racemis pentandris cylindricis erectis, caule inermi*, is appropriate for this species but rather ambiguous, and the source, Virginia, is implausible. Linnaeus referred the name to his Hortus Cliffortianus of 1737 and Hortus Upsalensis of 1748, where it had been associated with synonyms that Linnaeus transferred to *A. hybridus* in the Species Plantarum. Probably the notation of Virginia should have gone along in this transfer but was left behind as a relic of former lumping of the two species. The only synonym given for *A. hypochondriacus* in the Species Plantarum is *A. sylvestris maximus novae angliae, spicis purpureis* Tournef. (Tournefort, 1719, 1: 235), a name of uncertain meaning derived by splitting a species of Ray (1686-88, 1: 201) that was mainly if not entirely *A. hybridus*. The literature thus establishes that Linnaeus recognized a species similar to *A. hybridus* but distinguishable by its more erect and more intensely colored inflorescences. This hazy distinction becomes clear enough in the presence of a Linnacan herbarium specimen labelled *A. hypochondriacus* (LINN 1117.24).

- A. flavus* L., Syst. Nat. ed. 10, 2: 1269, 1759.

The original description and a longer one in the 1763 edition of the *Species Plantarum* are ambiguous. In the latter, the source is given as India. Fortunately there is a Linnaean herbarium specimen labelled *A. flavus* (LINN 1117.23).

- A. frumentaceus* Buch.-Hamilt. ex Roxb., Fl. Ind. 3: 613, 1832.

Buchanan-Hamilton originally applied his unpublished name to a grain crop, called *kicry*, he discovered on the hills of South India between Mysore and Coimbatore, where *A. hypochondriacus* is still a common crop under the same name. Roxburgh's description of the species was at least partly based on a large patch of amaranths planted in the East India Company's Botanical Garden, Calcutta. A specimen labelled *A. frumentaceus* in Roxburgh's herbarium (K) was designated by Sir E. J. Salisbury as the probable type, according to Hunziker (1952, p. 68).

- A. anardana* Buch.-Hamilt. in Wall. ex Moq.-Tand. in DC., Prodr. 13(2): 256, 1849.

Type: Bhagulpur and Nepal, Wallich 6903, Moquin-Tandon herbarium, P; possible isotype: Bhagulpur, Bihar, 2 Nov 1813, Buchanan-Hamilton 2028-1, E. In Wallich's catalogue, under 6903, *A. anardana* appeared as a *nomen nudum*, with collections listed from Bhagulpur, Beloya, and Nepal, 1821. There is no evidence that the Beloya collection was included in Moquin-Tandon's treatment, which is fortunate because it is probably Buchanan-Hamilton 2028-2 belonging to *A. caudatus*.

- A. hybridus* L. (var) γ *erythrostachys* Moq.-Tand. in DC., Prodr. 13(2): 259, 1849.

Type: France, seed from Montpellier Bot Gard grown in Toulouse Bot Gard, 17 Sept 1844, Moquin-Tandon herbarium, P.

- A. leucocarpus* S. Wats., Proc. Amer. Acad. 10: 347, 1875.

Type: United States, grown at Harvard Univ, 1874, seed obtained from Arizona Indians by Powell, s.n., US 15163; isotypes GH, MO, US.

- A. leucospermus* S. Wats., Proc. Amer. Acad. 22: 446, 1887.

Hyponym for *A. leucocarpus*.

Amaranthus hypochondriacus was evidently derived mainly from *A. powellii* by selection as a grain crop within the great region of its aboriginal cultivation in North America. Its distribution as a grain crop in Asia, although perhaps old, is clearly secondary and its wide dispersal as an ornamental is recent.

There has been at least local genetic admixture from another domesticate, *A. cruentus*, and its progenitor, *A. hybridus*. Active hybridization is surprisingly limited considering the great geographic overlap with close relatives. In Mexico both *A. powellii* and *A. hybridus* are common weeds of the *A. hypochondriacus* grain crop, and traces of the domesticate are easy to find in the weed populations. The effect of backcrossing to the crop is probably limited by the fact that hybrids mostly produce dark seeds that are rejected for planting. An exceptional case occurs in a highly aberrant race from Los Reyes, Michoacan, grown to make special black *tamales* and unique among Mexican grain amaranths in being entirely dark seeded (Appendix); this appears to be a stabilized hybrid between *A. hypochondriacus* and *A. hybridus*. In pale seeded grain crops, weed introgression is comparatively subtle, the clearest known case being in a Wariho Indian crop from Rancho Trigo, Chihuahua (Appendix); progeny raised from this grain are heterogeneous and some individuals definitely resemble *A. powellii*. In southern Mexico, particularly Oaxaca, local populations of *A. hypochondriacus* show some resemblances to *A. cruentus*, which is also planted there as a grain crop; similar atypical plants appear in the *A. hypochondriacus* grain crop of Madras, India, where *A. cruentus* has also been introduced (Appendix). Arizona Indian crops of *A. hypo-*

chondriacus, especially a dark seeded archaeologic specimen, may also show traces of introgression from *A. cruentus*, but the resemblance is too faint to be sure.

Amaranthus hypochondriacus as a New World Grain Crop (Fig. 1).

In Arizona, well preserved inflorescences and seeds of the species were recently excavated in a cliff-dwelling at Tonto National Monument (Univ of Michigan, Ethnobotanical Laboratory 4024A & 4038—both pale seeded; 4029—dark seeded; deposited at Southwest Archeologic Center, Globe, Arizona; fragments WIS). The occupation, dated at 1350 to 1400 A.D., was by Salado Indians practicing irrigated agriculture with maize, beans, and squash. Their culture was an amalgamation of Hohokam and Anasazi; earlier Hohokam cultivation of grain amaranths is suggested by large caches of charred seeds of an undetermined *Amaranthus* sp. (Bohrer, 1962, p. 108).

There are hints that the crop may have persisted in this region until recently. About 1890, the custodian of Casa Grande ruin (Whittemore, 1893, p. 52) was told by the Pima that a hundred years before, when they lived some miles west of Casa



Fig. 1. North American distribution of grain amaranths. Inset: pre-Conquest localities reported and provinces giving tribute of the grain to Moctezuma.

Grande, "they raised cotton, corn, melons, and pumpkins, and a small round seed which they ground and boiled as mush." This may be connected with a report by Russell (1908, p. 74) that the Pima used an unidentified annual plant called *k'ak*, whose seeds were popped like corn and ground on the metate.

The only tangible historic records of the species among the Arizona Indians are from farther north. Major Powell's mixed bag of domesticated and wild amaranth seeds, from which the types of *A. powellii* and *A. hypochondriacus* were grown, was probably collected during his stay with the Paiute; at any rate, Edward Palmer, who was also with the Paiute in the 1870's, reported they cultivated the latter and milled the seeds for bread and mush.

In Mexico, much of the early history of the grain amaranth crop depends on common names. At the time of the Conquest, the Nahuatl name *huauhtli* was widely used for both amaranths and chenopods, including those used as potherbs; however, *A. hypochondriacus* was probably the main if not the only species cultivated for grain. The paste made from the milled *huauhtli* grain was generally called *zoale*. In several Indian languages of northwestern Mexico, the same crop was called some variant of the word *guegui*. Beginning in the 17th century, the Spanish name *alegria* was applied to confections of popped amaranth grain and was gradually extended to the plants that produce it; the plants have also commonly been called *bledo*, the Spanish name for amaranths in general.

In the northwestern Sierra Madre during the colonial period, the Jova and Tarahumare Indians grew pale seeded grain crops under names similar to *guegui*, identified in Spanish with *zoale* or *alegria*. The grain was used much like maize, popped or toasted and milled. In 1953, Brugge (1954, personal communication) found *guegui* cultivated for *pinole* near the Tarahumare pueblo of Metate in Sinaloa and was told that it is still grown in the mountains of southern Sonora. The Mayo, Wariho, and Tepehuan Indians grow pale seeded *A. hypochondriacus* in the same general region under the name *guegui*, *huauhtli*, *bledo*, or variants (Appendix). Among the Yaqui in Sonora, Spicer (1954, p. 49) was told by the old people that amaranth seeds, called *we'e*, were formerly ground and used much like maize; they remembered the food as a delicacy that was presented to the spirits of the dead in All Soul's Day ceremonies; Spicer reported the seeds were black and were gathered from wild plants, but the name and ceremonial use suggest some traditional connection with the *A. hypochondriacus* crop. In the 19th century farther south in the Sierra Madre of northern Jalisco, the Huichol Indians cultivated a pale seeded amaranth called *wā-vē* that was almost certainly of this species; they milled the grain to make little cakes shaped like animals which played a central role in their greatest annual ceremonial.

In the tropical highlands of central Mexico, *huauhtli* was a major grain crop at the time of the Conquest. Moctezuma collected *huauhtli* tribute totalling about 200,000 bushels a year, nearly equal to maize tribute, from 17 provinces of the Aztec Empire (Fig. 1). During the 16th century, the crop was recorded as a traditional staple in the same region and far beyond, from Jalisco in the west to Oaxaca in the east. The grain was toasted, milled for *zoale*, made into tortillas, rolled into little balls, or powdered and drunk as *atole*.



Fig. 2. Ripening field of *A. hypochondriacus* grown for making alegrías, nr San Gregorio Atlapulco, D. F., Mexico. [Photo R. C. West]



Fig. 3. Young field of *A. hypochondriacus*, same area as Fig. 2. Photo [J. D. Sauer]

Among the Aztecs and their neighbors, the grain had unique religious importance. Idols of *zoale* were the centers of innumerable little household rituals and of the greatest state ceremonies and processions. Far to the south in Oaxaca, the grain evidently also had special significance for the late prehistoric Mixtecs; the famous Tomb 7 at Monte Alban contained a human skull encrusted with turquoise mosaic; the mosaic was set in a paste originally thought to be copal gum (Caso, 1932, p. 510) but shown by later analysis to be *zoale* (Caso, 1966, personal communication).

In Christian eyes the Mexican grain amaranth was the very symbol of heathen idolatry and its cultivation declined drastically during the colonial period. However, even in the valley of Mexico, pagan rituals involving *zoale* persisted into the 17th century. Rosaries with the beads made of *zoale* paste appeared in the late 19th century.

Amaranthus hypochondriacus is still grown here and there through the ancient *huauhtli* area, ordinarily in small patches near houses or in maize fields. The grain is still used as an ordinary food in scattered places, parched and milled much like maize; by far the commonest use nowadays is for *alegria* confections, like little popcorn balls bound with syrup, which have become traditional for certain festivals and saints' days.

There are only a few new records of the crop in central Mexico. In 1962, *alegria* cakes were common in the market at Tehuacán, Puebla (Whitaker & Cutler, 1966, p. 11). West (1966, personal communication) found a small plot of grain amaranths in the old Indian town of Oaxaca near Monte Alban and also saw *alegrias* on sale in the Tlacolula market nearby. Scattered fields of *A. hypochondriacus* have been maintained in the Xochimilco area (Fig. 2-3) to supply *alegrias* for the Mexico City market; some plantings are in *chinampas*, the so-called floating gardens, where legends recorded in the 16th century placed *huauhtli* cultivation before the Conquest.

Amaranthus hypochondriacus as an Old World Grain Crop (Fig. 4-5).

For at least a hundred years, the species has been a far more widespread and important crop in Asia than in its homeland. Early botanists and explorers generally took it for an indigenous domesticate because it was so well established in subsistence agriculture, more often than not in remote regions. There are, of course, other American Indian crops that followed the same pattern, including the Andean *Amaranthus caudatus* L. and perhaps *Chenopodium quinoa* Willd. A tall chenopod of uncertain identity which strongly resembles the latter has long been grown as a grain crop in the hills of northwest India, where it shares the name *bathu* with grain amaranths (Thomson, 1852, p. 49; Singh, 1961, p. 40).

The first known record of *A. hypochondriacus* in Asia was Linnaeus' description of a form from India under the name *A. flavus*. Later in the 18th century, just before the end of the Dutch period in Ceylon, Koenig collected a pale-seeded specimen there under a Sinhalese name meaning seed or grain amaranth (Appen-

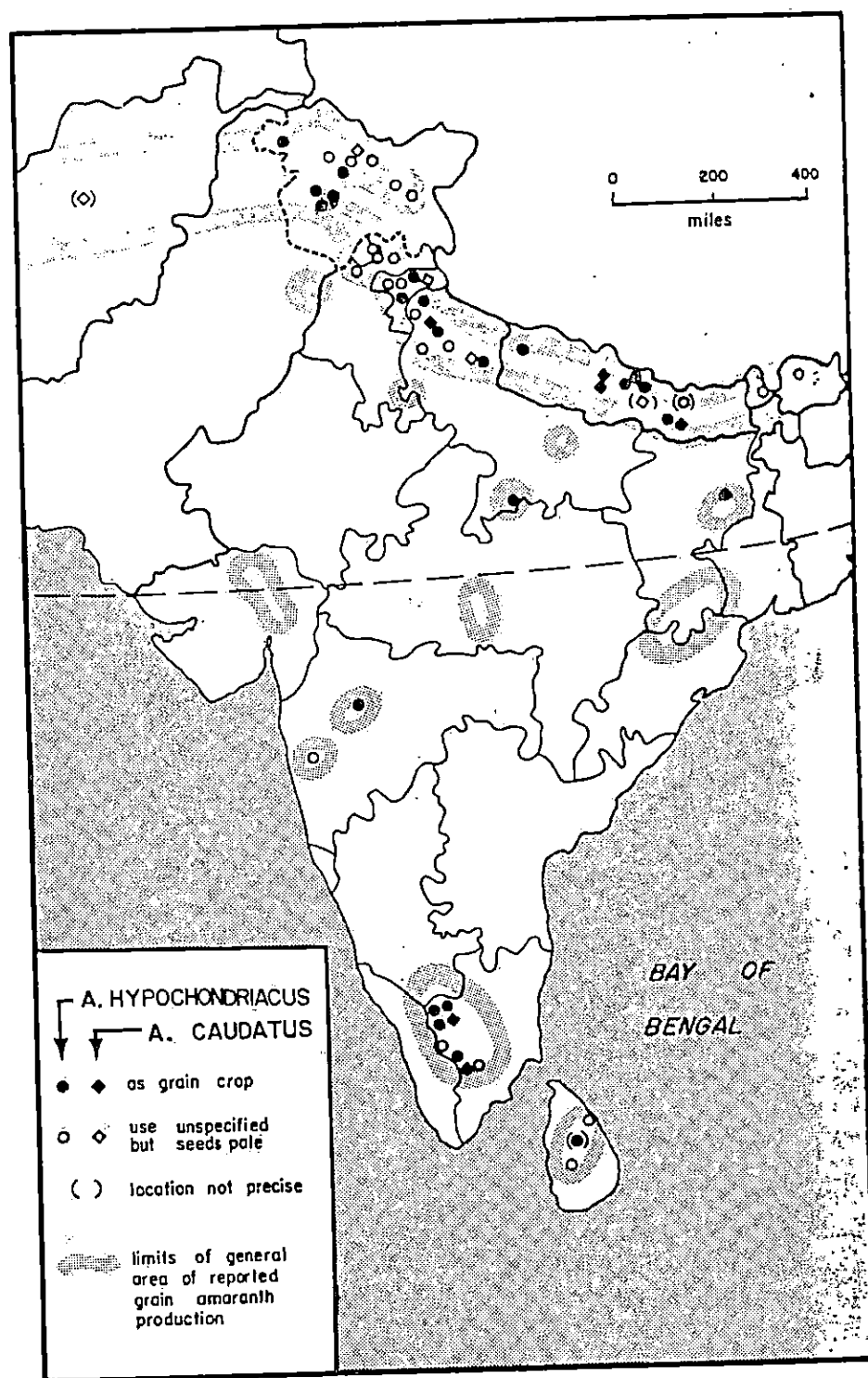


Fig. 4. Grain amaranth distribution in India and adjacent regions.

dix). In the 19th century, grain amaranths were also reported cultivated in Ceylon under the local name *landes* (= *hollandesi*?).

During the early and mid 19th century, *A. hypochondriacus* was collected and recorded as a grain crop among the hill tribes of south India, in the Deccan plateau, and in the Himalaya; during the late 19th century it was found through interior China to eastern Siberia (Appendix).

Some important early Himalayan records were not noted in the previous survey (Sauer, 1950a). In the northwest, Vigne (1844, 1: 36) stated that bread made from a grain of a crop called *batu* was a common food of Himalayan peasants; he identified the crop as a cockscomb or *A. cruentus*; it was almost certainly *A. hypochondriacus*. In 1833, Vigne saw red and yellow patches of the crop on hillsides at Serai near Simla; in 1835 he found it as a grain crop at Skardo and in 1838 in the valley of Kashmir (1844, 1: 36, 309, 2: 263). An amaranth had previously been noted among the grain crops of Kashmir by Moorcroft and Trebeck in 1823 (Wilson, 1841, 2: 132). Some of the earliest collections of *A. hypochondriacus* from Kashmir and the Simla area of Himachal Pradesh were made by Thomson (Appen-

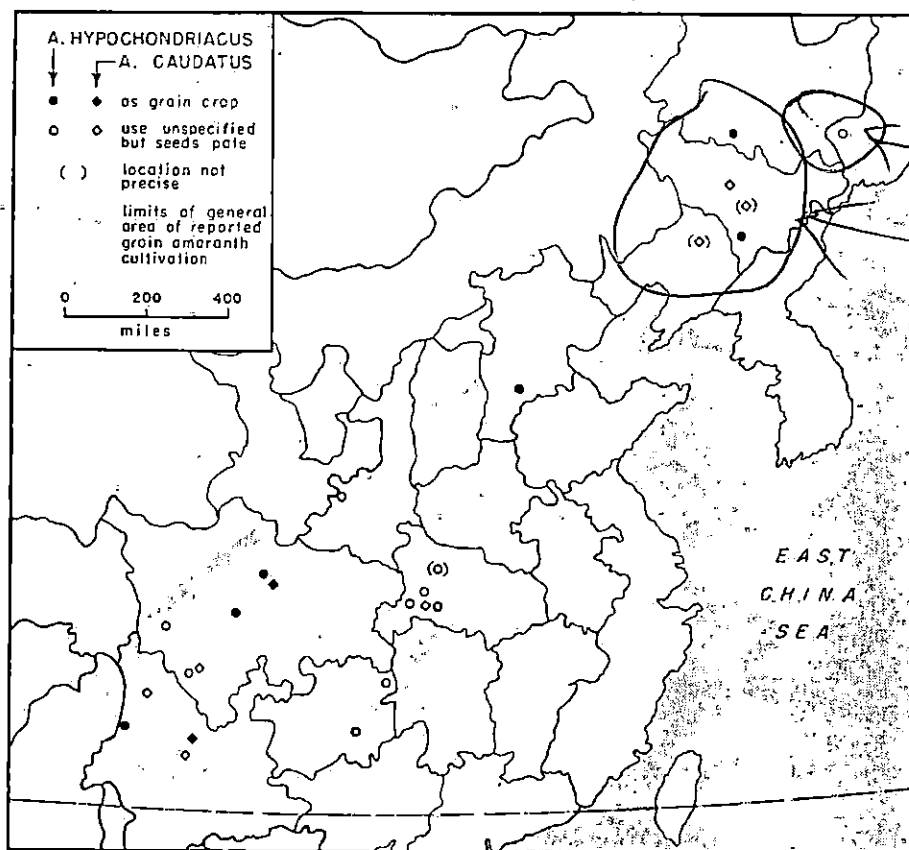


Fig. 5. East Asian distribution of grain amaranths.

dix). He wrote (1852, p. 49) that there were many fields of *Amaranthus* near Simla, on ridges above the Sutlej Valley, and that it was "occasionally cultivated in all parts of the hills, its bright red inflorescence, in autumn, tinging with flame the bare mountain slopes." Also near Simla, Markham (1854, p. 78) saw crops of *batu* clothing the cultivated spots with waving plumes of yellow and vivid crimson; he recognized *batu* as a kind of prince's-feather, the ornamental *A. hypochondriacus* of English gardens. Markham wrote that in the Himalaya it was "extensively grown throughout the hills as a staple grain and the bread made from its seeds is the common food of the people." Farther east, in Uttar Pradesh, the species was collected under the name of *A. anardana* by Madden (Appendix). He listed it (1848, p. 443) among the common grain crops of Kumaon, where it was called *chooa* or *ramdana*. On the border between Uttar Pradesh and Nepal, Henry Strachey (1848, p. 109) found the Bhotiya people of the Kali Valley growing crops of red and white amaranths; *A. hypochondriacus* was collected nearby, without comment, by his brother and other contemporaries (Appendix).

Through most of its Asiatic range, the species has been cultivated only on a very small scale, scattered through other crops, in rows along field edges, or in gardens by houses. It has been noted as a staple crop only in the Himalaya and the hills of southern India. Mostly it is planted above 1500 m elevation, continuing nearly to the upper limits of agriculture.

As in Mexico, the crop is ordinarily pale seeded where carefully maintained, but dark seeded plants are often present as scattered individuals and may become predominant where the crop is planted in a desultory fashion or allowed to seed itself. Dark seeded specimens without definite notation of grain use are omitted from the maps because they may be weedy volunteers. For example, collections of millet grain from Karakoram (Nakao 1157, 1159, 1178) contained dark amaranth seeds as a contaminant; when grown out (Sauer 2534, 2536, 2537, WIS), these proved to be *A. hypochondriacus*. Unfortunately, some grain crop specimens are probably thus excluded. In Iran and Afghanistan in the late 19th century, an unidentified amaranth was reported as a very minor grain crop; the only available *A. hypochondriacus* specimens from this region are dark seeded (e.g. Johnston s.n. 1880, nr Shaikhabad, Afghanistan, E; Koelz s.n., 1940, Saidabad, Kerman, Iran, *kharus*—progeny: Cowgill 2354, GH). These lack data on use but the Tajic name on the Koelz specimen is like that reported for the grain crop.

The grain is used in Asia much as it is in Mexico; it is parched and milled, the dough patted into thin tortilla-like pancakes called *chapatis*; it is cooked for gruel; it is popped and made into confections with honey or syrup binder. It is also used in peculiarly Asiatic recipes and there is one fascinating account from India of fermenting the grain for beer (Hunziker, 1952, p. 77). Among Hindus, popped amaranth grain soaked in milk is the only food permitted on certain festival days (Singh, 1961, p. 4), which may simply mean that it entered the scene too recently to be covered by traditional taboos.

At present, the crop seems to be spreading out of the back country into the plains of India. It has recently been reported for the first time around Delhi and in the states of Madhya Pradesh and Gujarat (Singh, 1961, pp. 2-4, 8). The common

name in these regions, *rajgira*, is the same reported for the crop in the Deccan early in the 19th century. Singh states that it is now widely grown in the north Indian plains, usually in scattered patches or mixed with chili peppers, eggplant, and other vegetables; he published a photograph (1961, p. 10) of a mixed crop of *A. hypochondriacus* and eggplant in a Delhi village. In eastern Gujarat near Mehsana and Nadiad, amaranth is grown as a pure crop under intensive cultivation and irrigation, 300 acres yielding about 250,000 lbs of grain, which is mainly shipped to Delhi and other big cities of northern India. Much of it is popped for *laddoos*, confections like the *alegrías* of Mexico, which are sold in the Delhi area by a large number of refugee families from West Pakistan as their sole means of livelihood (Singh, 1961, pp. 4, 20). Another area of important recent cultivation is around Fyzabad in the Gogra plains of Uttar Pradesh; there the pale seeds are called *randana*, as they were in parts of the Himalaya over a hundred years ago; they are popped to make confections, especially for the September festival of Janam-Ashtami (Panje, 1960, personal communication). The species has also appeared recently in Maharashtra (Appendix), where it is grown along the edges of fields and in small plots near houses; the grain is cooked with milk and sugar (Kelly, 1960, personal communication).

Other recent records show persistence of the species in areas where it was previously reported. In the south Indian hills, it is still grown under the Tamil name *keerai* reported 150 years ago. Singh (1961, p. 10) published a photograph of *A. hypochondriacus* cultivated by the Badagas of the Nilgiri Hills. In 1962, Noble found a few amaranths grown with maize, beans, and squash near almost every Badaga house (Noble, 1962-64, personal communication). He noted that the Badagas mix stone-ground amaranth meal with sweetened milk to make porridge and pop the grain in a shallow iron pan or in an earthenware pot with a hole in the side. The popped grain is eaten plain or in balls made with honey or syrup. Baskets of it and of other popped cereals are placed as offerings on Badaga funeral pyres. Noble also found the species sown on field edges and scattered through millet fields of the Irula and Kurumba tribes in the Nilgiri Hills and among the Maddi and Chettiar tribes in the Pulni Hills (Appendix). Dark seeded forms of *A. hypochondriacus* are evidently grown in the south Indian hills only as potherbs.

There are many new records of the crop in its old Himalayan regions. In Kashmir, Polunin collected it at several places in 1956, mainly from small plantings on verges of maize fields (Appendix). His notes agree with a statement by Randhawa & Nath (1959-61, I: 218) that in Kashmir the grain, called *ganhar*, is parched, ground, and eaten with milk or water, especially by Hindus on fast days. Polunin collected random samples of 25 plants from each of five different localities; three of these included two or three dark seeded plants and the other two lots were entirely dark seeded. In the Karakoram of Gilgit, Nakao (1956, personal communication) met with the species many times, not in fields but in small garden patches; the grain is eaten by the Hunza. Also in Gilgit, Harlan found the species grown for grain in a Shimal garden in 1960 (Appendix).

In northwest India, the crop is still important in the hills and Himalayan valleys of Himachal Pradesh, the Punjab, and Uttar Pradesh. In the Kullu Valley, Punjab, about 2,000 acres yielding perhaps 400,000 lbs of grain were grown in 1956-57; the boiled grain makes a gruel called *phambra* (Singh, 1961, pp. 4, 20). Singh published a striking color photograph of red and yellow *A. hypochondriacus* in the Kullu Valley. In Uttar Pradesh, particularly around Mussoorie, around Tehri in the Kumaon Hills, and all over Garhwal, the grain is milled for bread and thin *chapati* pancakes; confections of popped grain are sold in local bazaars (Singh, 1961, p. 4; Lal, 1961, personal communication; Andress, 1965, personal communication). Andress found *A. hypochondriacus*, called *chaulai*, one of the staple monsoon crops in the mountains around Mussoorie; it is planted alone or with millets, often on very poor, stony ground; at elevations above 1800 m it yields better than almost any other crop but is considered inferior in taste to true cereals. The 1952 Oxford University Expedition to Tehri-Garhwal found fields of the crop reddening the landscape around Harsil, a village at 2500 m elevation in the Bhagirathi Valley. Harsil is occupied seasonally by Hindu farmers and Bhotiya-related traders who are intermediaries between the Hindus and Tibetans. Photographs of the crop at Harsil (Fig. 6-7) were taken by Tyson, the expedition leader; one has previously been published in color (Tyson, 1953, p. 140). Specimens were collected (Appendix) by an expedition member, Paul Huggins, who died a few days later on a descent from Gangotri peak.

In western Nepal in 1953, Tyson found the species at Biunera, an unmapped village 25 miles due east of Baitadi, and also at Chainpur, 20 miles farther east in the Seti Valley; at both places the crop is called *marcha* and flour made from the grain is called *phajun*. The crop is also grown in the area around Chainpur.

In central Nepal in 1952-53, the Japanese Himalayan Expedition found little patches of grain amaranths were a characteristic feature of the agricultural landscape, especially on newly cleared mountain slopes. The mixed red and yellow spikes were very colorful when the crop was maturing in the fall. Photographs taken on this expedition by Nakao show *A. hypochondriacus* as an aftercrop in a maize field near Jagat in the Marsyandi Valley, about 20 miles southeast of Annapurna (Nakao, 1956, p. 101, plate 14; Nakao & Sauer, 1956, p. 143). Nakao also collected the crop 40 miles farther east at Tsunje and Thonje in the Shiar Kola Valley (Appendix). It is generally called *nana* by the Nepalese, *pilim* by the Sherpa; the grain is boiled for gruel and ground for flour.

I have no new information on the species in China except from Manchuria. In 1956, Hanelt saw small plots of grain amaranths there, particularly near Harbin and Chiamussu in Heilunkiang; they were cultivated at the margins of fields of farmers and cooperatives (Hanelt, 1958, personal communication). Hanelt also obtained a specimen from an agricultural experiment station in Kirin (Appendix). Nakao (1957, p. 409) saw a field of *A. hypochondriacus* in the Kirin area in 1944.

A surprising outpost of *A. hypochondriacus* appeared recently in Uganda, where it was collected in 1945 and 1946 as a grain crop in the Masaka District

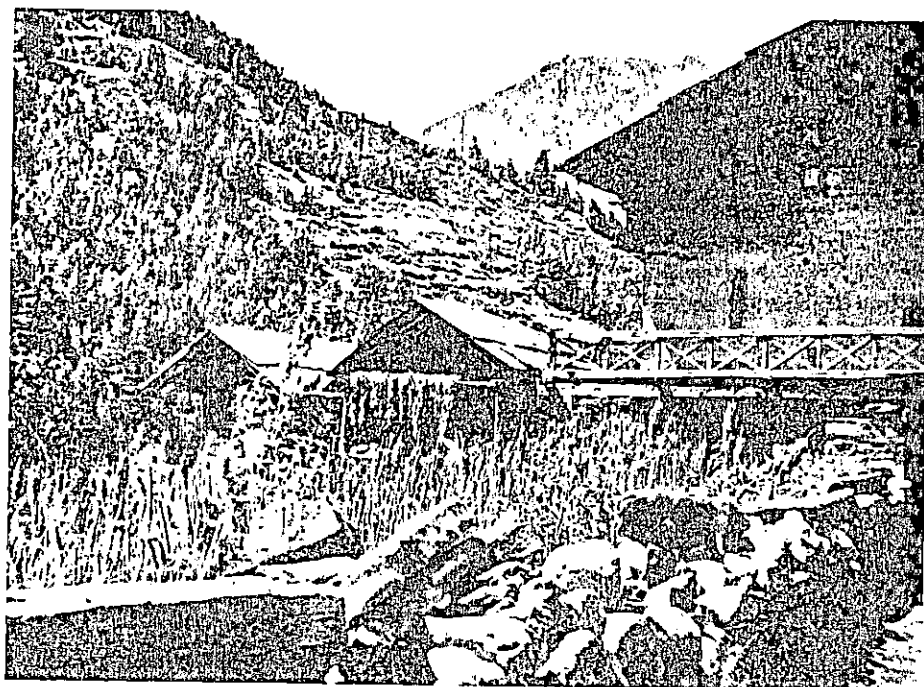


Fig. 6. Walled field of *A. hypochondriacus*, Harsil, Tehri-Garhwal, India. [Photo J. Tyson]

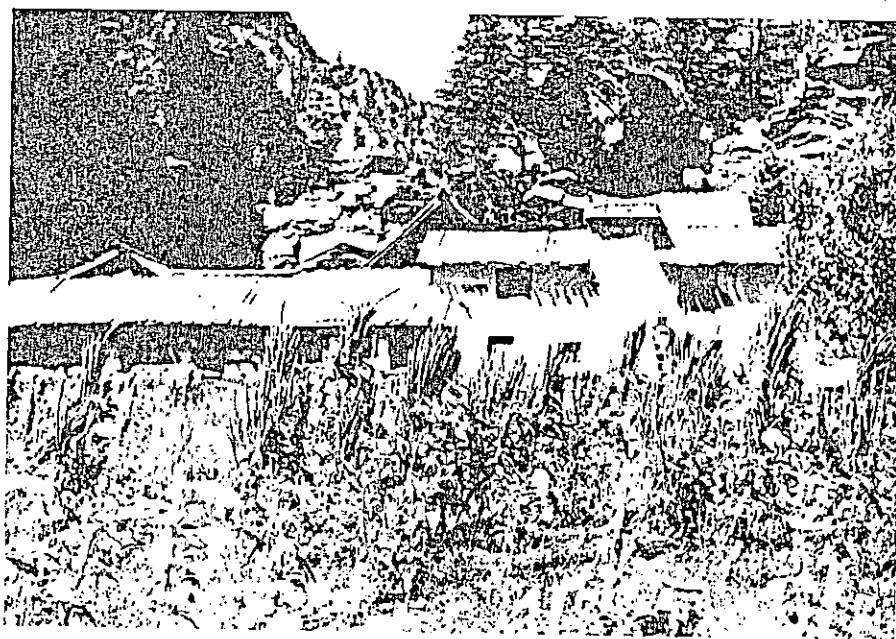


Fig. 7. Patch of mature *A. hypochondriacus* in garden, Harsil, Tehri-Garhwal, India. [Photo J. Tyson]

(Appendix). According to Pursglove (1964, personal communication), during World War II, when imported Indian food grains, mainly pulses and amaranth, became increasingly scarce in east Africa, the local Indian population provided seed for planting by African cultivators. The first small amaranth crop was sold in 1943 at a shilling per lb. By 1945, 66 tons of the grain were sold in Masaka at a much lower price. The grain was used primarily on Hindu fast days and was not known to have been eaten by Africans.

Amaranthus hypochondriacus as a Cosmopolitan Ornamental.

There is no record that the American Indians ever planted this species primarily for its color or as a dye plant, but they evidently favor red and yellow forms in the grain crop. Such pigmentation was the main reason the species was taken into European gardens. Selected forms, scarcely gaudier than those of the aboriginal grain crop, have been widely disseminated as ornamentals, particularly in temperate regions with a European gardening tradition. These ornamentals are invariably dark seeded, as are all specimens of *A. hypochondriacus* known from European botanical gardens, even those from the 18th century.

It is uncertain how long the species had been in Europe before Linnaeus encountered it in Clifford's garden in Holland early in the 18th century. It may be represented in some puzzling earlier descriptions of amaranths grown in European gardens, some dating back to the 16th century, but it is possible that all of these were forms of *A. caudatus*. Older common names for ornamental amaranths in Europe, such as flower-gentle, *floramour* and *Mayer*, were highly ambiguous and even shared with ornamentals in other genera, *Celosia* and *Gomphrena*. The distinctive English name for *A. hypochondriacus*, Prince-of-Wales'-feather or prince's-feather, appeared in the early 19th century.

AMARANTHUS CRUENTUS L., Syst. Nat. ed. 10. 2: 1269, 1759.

The phrase-name, *A. racemis pentandris compositis patulo-nutantibus, fol. lanceolata-ovatis*, is appropriate but inadequate for identification. In the 1763 edition of the Species Plantarum, Linnaeus inserted China as the habitat and cited *A. sinensis foliis variis* Mart. (Martyn, 1728-37, pl. 6) as a synonym. Martyn's plate, a fair likeness of the species, was drawn from "Chinese" plants cultivated in gardens around London. There is a specimen in the Linnaean herbarium labelled *A. cruentus* (LINN 1117.25).

A. paniculatus L., Sp. Pl. ed. 2, 2: 1406, 1763.

The phrase-name, *A. racemis pentandris supradecompositis, partialibus patentibus*, is compatible with but not diagnostic of the species. Linnaeus noted that *A. paniculatus* resembled *A. cruentus*, but was taller, and gave the habitat as America. There is a specimen in the Linnaean herbarium labelled *A. paniculatus* (LINN 1117.20).

A. sanguineus L., Sp. Pl. ed. 2, 2: 1407, 1763 (pro parte).

Linnaeus' description is ambiguous. He cited a description and plate of a plant grown by Miller from Bahamas seed; I have seen only a later reproduction (Miller, 1768), which is evidently *A. cruentus*. A specimen in the Linnaean herbarium labelled *A. sanguineus* (LINN 1117.21) belongs to *A. caudatus*.

A. speciosus Sims, Curtis Bot. Mag. 48: 2227, 1821.

The plate, which is a fair likeness of *A. cruentus*, is based on plants grown in England in the garden of Sir George Staunton, Leigh Park, from Nepal seeds obtained from H. I. Colebrook. There is no doubt that *A. cruentus* was in Nepal at the time; specimens collected there by N. Wallich in 1821, labelled *A. speciosus*, are in the Moquin-Tandon herbarium (P) and the de Candolle herbarium (G).

Amaranthus cruentus evidently originated as a domesticated grain crop somewhere in southern Mexico or Guatemala, the only region where it is found in aboriginal cultivation within the range of its probable progenitor, *A. hybridus*. Its wide range as a dye plant, ornamental, and potherb is certainly secondary, although not necessarily entirely modern.

As a rule, the species is extraordinarily homogenous but there is some diversity in pigmentation within the grain area and some other local variation attributable to hybridization with other species. The *A. cruentus* grain crop is often intimately associated with weedy populations of its probable progenitor, *A. hybridus*, and it is easy to find traces of introgression on both sides. However, interbreeding has evidently been limited by natural selection against hybrids in the weed populations and artificial elimination of hybrids, especially those with dark seeds, from the crop. Crossing with the other North American grain crop, *A. hypochondriacus*, has more pervasive effects; the few collections of *A. cruentus* as a Mexican grain crop all show definite traces of such crossing (Appendix). Where *A. cruentus* is grown as a Pueblo dye plant within the native range of *A. powellii*, hybridization with the latter occurs (Bohrer, 1960, p. 199). As a cosmopolitan ornamental, *A. cruentus* has occasionally mixed with weedy populations of *A. powellii*, *A. hybridus*, and *A. retroflexus*. The resulting hybrids are partly sterile and usually ephemeral, but some have developed into locally successful weeds (Tucker and Sauer, 1958, p. 260; Grant, 1959b, p. 320).

Amaranthus cruentus as a New World Grain Crop (Fig. 1).

The species has not been identified archaeologically. It is, of course, not certain that the zoale paste found in the prehistoric Mixtec tomb at Monte Alban was made from *A. hypochondriacus* grain, as suggested above, rather than from *A. cruentus*. The former species is more important in Oaxaca today, but Kaplan recently collected *A. cruentus* among the Mixtec near the Pacific coast (Appendix). Called *chian*, which ordinarily refers to *Salvia*, it is grown only by the Indians, who sow it as a minor crop in milpas with maize or by itself; the milled grain is used for *atole* and mixed with maize for tortillas (Kaplan, 1954, personal communication). The few previous records of the species from Mexico (Appendix) suggest it was locally a minor component of the grain amaranth crop, indistinguishable in historical records from the dominant *A. hypochondriacus*.

In Guatemala the situation was reversed, *A. cruentus* being the more important of the two, although it is now a declining relic. In 1947, it was regularly grown in a few temperate zone villages in the departments of Guatemala and Chimaltenango and in a lower-lying region in Alta Verapaz, usually on a very small scale. Both pale and dark seeded forms were present; both were called *bledo* in Spanish



Fig. 8. Semi-cultivated plant of *A. cruentus*, edge of milpa, nr San Juan Sacatepequez, Guatemala. [Photo J. D. Sauer]

and variants of *tez* in the Maya dialects. Dark seed was used only for tortillas; the pale seed was much preferred for tortillas and was prepared in various other ways, much like maize, for home consumption. It was also popped for confections identical to the *alegrias* of Mexico, but here called *niguas*, which were peddled widely at certain seasons.

Revisiting some of these areas in 1966, I could find only vestiges of the crop. Between San Juan Sacatepequez and San Raimundo in the department of Guatemala and near El Tejar in Chimaltenango, plants of *A. cruentus* are still conspicuous along the edges of some milpas and in a few dooryard gardens (Fig. 8). However, all the plants seen were said to be volunteers or planted simply by scattering some seed at the time of harvest. Moreover, all the plants were dark seeded and I could find nobody that had a supply of the pale seed. The farmers all knew about *niguas* but said they were now not often made, being more expensive than a similar confection, *alborotos*, made of popped sorghum grain.

I have not been back to Alta Verapaz to see whether the crop persists there, but in 1965 small scale cultivation was encountered not far away by Barbara Denton and Alan Covich; they found *A. cruentus* grown, under the name *ses*, at Ensenada and El Estor in the lowlands of Izabal, the grain being milled and made into little cakes as confections (Covich, 1966, personal communication).

Amaranthus cruentus as a New World Dye and Ceremonial Plant.

The domesticators of the species may have been at least incidentally interested in coloration of the plants from the start and forms evidently selected for striking

pigmentation were carried in the Central American grain crop. However, the only American Indian peoples known to have planted the species primarily for its pigment were the Pueblos of the Southwest. A special form with the whole plant body as red as a beet was grown by the Hopi, Zuñi, and Rio Grande pueblos. A water extract of the entire inflorescence was used to dye the pink maize wafer bread for ceremonial dances. The seeds, invariably dark, were apparently not eaten. The Hopi had their own name, *komo*, for this plant but the Mexican name *alegría* was used in the eastern pueblos. The only hints of a possible aboriginal track northward from Central America are an old collection of *A. cruentus* grown for unknown reasons in the Tarahumar area of Chihuahua and a report of an unidentified bright red amaranth used to color maize dough in Guerrero (Sauer, 1950b, pp. 412-414).

During the 19th century, the Pueblo dye amaranth was carefully cultivated in irrigated terrace gardens but the Hopi have lately neglected it, substituting vegetable coloring bought from the trader (Farmer, 1953, personal communication). In Zuñi gardens it is now mostly allowed to reseed itself and it is gradually being lost by crossing with the weedy *A. powellii* (Bohrer, 1960, p. 199).

Amaranthus cruentus as a Cosmopolitan Ornamental and Potherb.

Dark seeded forms of the species, some approaching the Pueblo dye form in intensity of plant color, are now commonly grown in the wet tropics and some temperate regions. Ordinarily they are planted in gardens as ornamentals and potherbs; occasionally they have magical, imaginary medicinal, or other esoteric functions.

The present range of planting as an ornamental and potherb includes the grain crop region; in fact, *A. cruentus* is the commonest garden amaranth of Central America in general. How much of this range was aboriginal is unknown. By the time the species distribution began to be revealed by extensive botanical collecting, it had already been adopted into non-indigenous cultivation throughout Latin America and far beyond.

As noted in the discussion of nomenclature, the species reached Europe in the early and mid 18th century via China, the Bahamas, and other unspecified New World sources. The original European descriptions show that bright red or deep red forms were introduced at the start. Martyn (1728-37) praised it as elegant and colorful. Miller (1768) said the plants were beautiful and gay the first two years they were sown in England but afterward the seed degenerated. However, stabilized color forms are still widely grown in European style gardens, often called cockscomb like the distant relative, *Celosia argentea*.

In the Old World tropics, the chronology and geography of the species' immigration are quite mysterious. As already noted, it was attributed to China and India in 18th century literature and collected in Nepal in 1821. By 1850, it was common in south India (e.g. Madras collections by Buchanan-Hamilton, Elliott, Thomson, & Wight, all E). It is still commonly planted as a potherb there and the seeds are sold in commercial packets. The Badagas, who cultivate *A. hypochondriacus* as a grain crop high in the Nilgiri Hills, plant *A. cruentus* as a potherb

in lower sites (*Noble s.n.*, 1963, Marakari, WIS). Asiatic cultivation of *A. cruentus* is mostly outside the grain amaranth regions, and extends through the tropical and warm temperate parts of India, Indo-China, China, Japan, the Philippines, and Indonesia. In New Guinea, it has been found as a fetish planted among the crops (*Stoner s.n.*, 1949, nr Lac—progeny: *Sauer 1536*, WIS). There are collections from a few Pacific islands, the earliest (1860) from Fiji (*Seemann 367*, GH).

In tropical Africa, *A. cruentus* has had a remarkable distribution as a potherb, ornamental, and for superstitious medicine. It was collected on Livingstone's expeditions in the Zambesi and Nyassa regions in 1859 and 1861, on Speke and Grant's expedition in the Lake Albert and Lake Victoria regions in 1862, by Burton in the Congo in 1863, Schweinfurth on the Sudan-Ethiopian border in 1865, Welwitsch in Angola in 1879 (all K), and by innumerable later explorers from French Guinea through the heart of the continent to the east coast and Zanzibar. The only record suggesting cultivation as a grain crop is a note on one collection that the seeds are edible (*Scott-Elliott 4653*, 1891, Sierra Leone, K). *Amaranthus cruentus* is almost certainly the source of the beloved red dyestuff that Dammer (1895, p. 402) reported was obtained from the large blood red inflorescences of an amaranth much cultivated in the Lake Region of East Africa. Dammer called the species *A. caudatus*, which is actually scarcely known in tropical Africa outside Ethiopia. In African botanical literature and herbarium collections, *A. cruentus* usually masquerades as *A. caudatus*.

AMARANTHUS CAUDATUS L., Sp. Pl. 990, 1753.

The phrase-name, *A. racemis pentandris cylindricis pendulis longissimis*, which is diagnostic, derives from Linnaeus' Hortus Cliffortianus of 1737. Evidently he first became acquainted with the species in Clifford's garden in Holland, where it was recognized as a South American native. Linnaeus later connected it by citations in his Hortus Zeylanicus of 1747 with Ceylon plants collected by Hermann in the 1670's, and in his Hortus Upsalensis of 1748 with plants grown in Sweden. Other synonyms cited in the Species Plantarum are *A. maximus* Bauh. (Bauhin, 1623, p. 120) and *Blitum majus peruvianum* Clus. (Clusius, 1601, 4: 81). Linnaeus gave Peru, Persia, and Ceylon as habitats, the first evidently after Clusius, the others after Hermann, who called his Ceylon plants *Blitum persicum maximum*, for reasons unknown. All these cited names probably are actually synonymous, although not all are positively identified. There is a specimen bearing Bauhin's name, *A. maximus*, in the Hortus Cliffortianus herbarium (BM) and a specimen labelled *A. caudatus* from the Uppsala Botanic Garden (LINN 1117.26).

A. sanguineus L., Sp. Pl. ed. 2. 2: 1407, 1763 (pro parte see synonymy under *A. cruentus*).

A. caudatus L. (var.) *δ alopecurus* Moq.-Tand. in DC., Prodr. 13(2): 256, 1849.

Type: Ethiopia, nr Aduwa, ruderal. 1 Nov 1844, *Schimper 1535*, Moquin-Tandon herbarium, P; isotypes G, GH, K, MO, US. Another collection was cited from the same locality: 10 Nov 1838, *Schimper 1077*, G, MO, US. (*A. alopecurus* Hochst. ex A. Br. et Bouché, Ind. Sem. Hort. Berol. App. 1, 1872, is based on the same specimens as Moquin-Tandon's variety; in both cases, the name was taken from Hochstetter's nomen nudum on the printed labels of Schimper's collections).

A. mantegazzianus Passerini, Ind. Sem. Hort. Bot. Parma, 4, 1865.

Based on plants grown in Italy; seed obtained by Mantegazza from grain crop, *quinoa blanca*, in Salta and Jujuy, Argentina. Neotype designated by Hunziker (1951, p. 105): Argentina, Colalao del Valle, Tucuman, grain crop, *chacion*, *quinoa de Castilla*, 23 Mar 1943, Hunziker 2555, CORD (not seen); duplicates K, S, Si, US.

A. edulis Spegazzini, Physis 3: 163, 1917.

Type: Argentina, plants grown at La Plata from seeds of Indian grain crop, *trigo inca*, collected in 1897 at Amblayo, Salta, Spegazzini, s.n., LP 16.325 (not seen, but Hunziker's description of the type (1943, pp. 322-323) is meticulous).

Amaranthus caudatus probably originated by domestication of *A. quitensis* as an ancient Andean grain crop. Its wide introduction elsewhere as a grain crop and ornamental is certainly secondary and probably post-Columbian.

The species, like other grain amaranths, has a spectrum of plant color forms. It also has some variations in inflorescence structure and seed color not found in any other *Amaranthus* species. The *A. caudatus* grain crop includes a variety of inflorescence types, some resembling those of other domesticated amaranths, some with peculiar drooping branches; the commonest ornamental has an almost unbranched, pendulous inflorescence like a long, red tail. An even more bizarre form has inflorescence branches with determinate growth, each tipped by an abnormal polymorous staminate flower; as a result, the inflorescence branches become club shaped rather than tapering toward a continuously growing tip. This form is known only from northwest Argentina, where it is planted as a grain alone or together with ordinary *A. caudatus*. It has been given species rank, as *A. edulis* or *A. mantegazzianus*, but is probably merely a conspicuous mutant. No possible progenitor other than *A. caudatus* is known.

Some forms of *A. caudatus* have ordinary wild type dark seeds or plain ivory seeds like the other grain species, but the commonest forms have ivory seeds flushed with red around the rim. Unfortunately, this unique character of *A. caudatus* usually cannot be detected on older specimens because the red tinge fades.

In its native area, the species has some variation attributable to local interbreeding with weedy populations of *A. quitensis*. In its wide migrations as a crop and ornamental, *A. caudatus* has repeatedly mixed with various weed relatives and may have contributed to some complex hybrid weed populations (Tucker and Sauer, 1958, p. 260). However, most forms of *A. caudatus* show no trace of hybridization with weeds or other domesticates. Even in Asia, where *A. caudatus* and *A. hypochondriacus* now share an enormous range as grain crops, only a few sterile hybrids are known (e.g. *Hooker s.n.*, Sikkim, L).

Amaranthus caudatus as a New World Grain Crop (Fig. 9).

The oldest record of the species is from an urn found in a late pre-historic site in Salta, Argentina; it contained flowers and both pale and dark seeds of *A. caudatus*, together with maize, beans, and chenopod seeds. The crop is not usually distinguishable in early chronicles from the superficially similar *Chenopodium quinoa*; both often share the common name *quinoa* and are grown as grain crops by the same Andean peoples. Hunziker (1952, p. 74) points out that *A. caudatus*

had an advantage over *Chenopodium* in mountainous regions where water was scarce, because its grain is free from the bitter saponins that must be leached out of chenopod grain.

The first recognizable reference to *A. caudatus* as a grain crop was the description and illustration of *Quinua sive Blitum majus peruvianum* by Clusius (1601). In 1635 in Ayacucho, Peru, red and white amaranths were very common foods of the Indians, and the seeds of the white form were also made into confections.

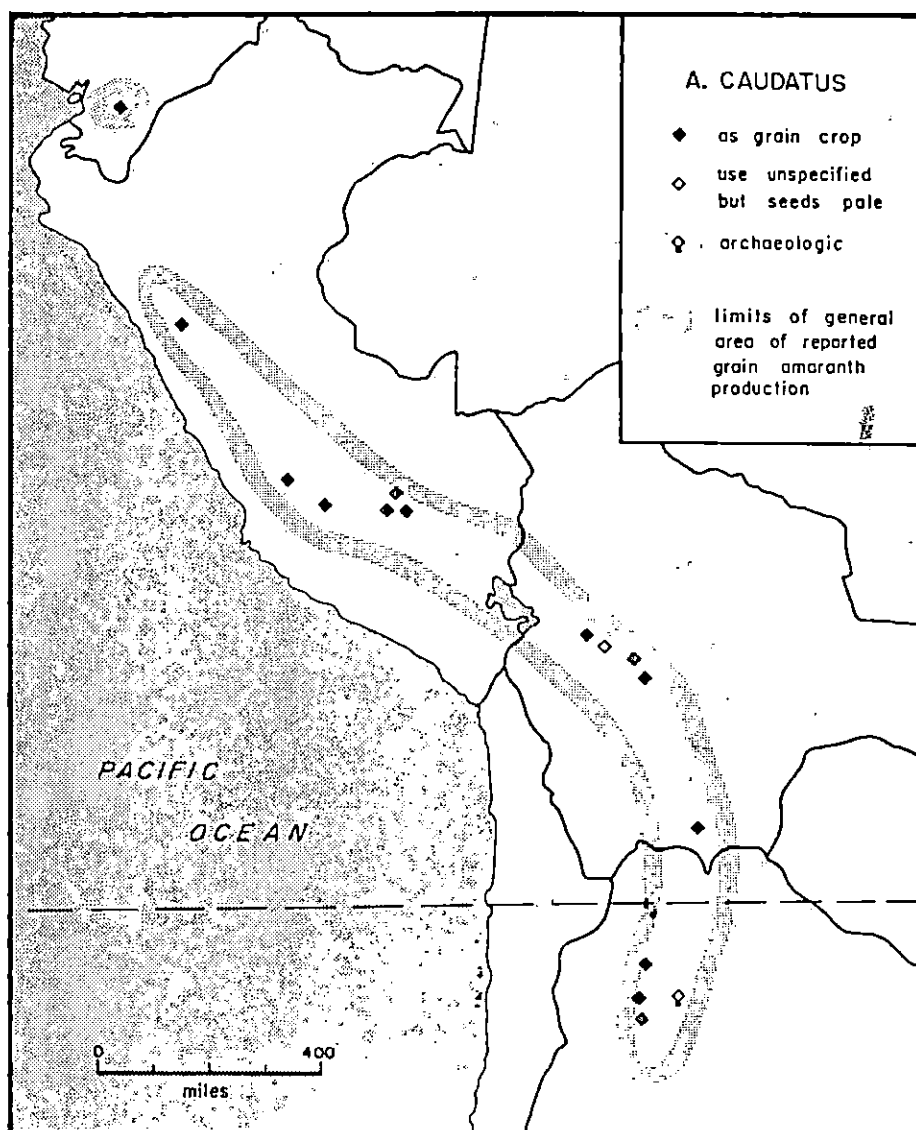


Fig. 9. South American distribution of grain amaranths.

Modern botanical exploration, beginning late in the 19th century, has turned up many cases of cultivation in temperate and cool temperate valleys of Peru, Bolivia, and Argentina. The crop is grown only by Indian peoples, usually in very small plantings near houses or on the edges of maize fields. The grain is toasted and popped, boiled for gruel or stews, or ground into flour. Pale seeds, reddish tinged or plain, are preferred but some dark seeds are often mixed in the harvested grain.

The crop is obviously a declining relic and there are few new records. In Bolivia, Urquidi (1954, p. 151) and Henkel (1966, personal communication) report persistent cultivation in the department of Cochabamba; a row of plants is grown along the edges of maize fields, the toasted grain being used especially for children or invalids and the stalks being useful in fencing and roof construction. There are recent collections of the species as a minor grain from several places in Bolivia and Peru (Appendix). Commerce in the grain in the Cuzco region has been described (Hunziker, 1952, pp. 74-75) as conducted by witch-doctors from the Altiplano; they carry bags of amaranth flour for sale to the natives, who mix it into *chicha* and consider it excellent food.

In Ecuador, the first known record of the crop was a note by Luis Cordero in 1950 (cited by Heiser, 1964, p. 137) that the grain of an amaranth called *quinua de tostar* was eaten in the provinces of Azuay and Cañar. In 1966, Heiser found several Indian families in this region cultivating *A. caudatus* for grain under the name *quinoa* (Appendix; Heiser, 1966, personal communication).

Amaranthus caudatus as an Old World Grain Crop (Fig. 4-5).

The species had been introduced to Asia before 1700, if Linnaeus identified Hermann's Ceylon plants correctly. The oldest available Asiatic specimens were collected in northern India and Nepal in the early 19th century. By the middle of the century it had been found scattered widely through the Himalaya and into Afghanistan; before 1900 it was in China as far north as Manchuria (Appendix). The listed specimens have pale, sometimes reddish, seeds; dark seeded forms were also collected early but more rarely in Asia (e.g. *A. von Schlagintweit* 5720, 1856, Baltistan, E; *H. & R. von Schlagintweit* 1482, 1856, Ladak, GH).

None of the early collections bear data on purpose of cultivation, but in the present century pale seeded forms have been recorded as a grain crop at several places in the Himalaya and China. Uses are similar to *A. hypochondriacus*, which is grown at more places and in larger quantities over the same general range.

There are some additional records from Asia. The Japanese Expedition to Nepal Himalaya found *A. caudatus* grown for grain at three villages on the slopes of Annapurna in 1953 (Appendix; Nakao & Sauer, 1956, p. 142). It was recently photographed growing with millet in the Kullu Valley, Punjab; there and in India in general, it is grown only as scattered plants or in very small plots and is less common and important than *A. hypochondriacus* (Singh, 1961, pp. 12-14). In the Nilgiri Hills of Madras, the Kurumbas, who commonly cultivate *A. hypochondriacus*, occasionally also plant *A. caudatus* for grain and as a potherb (Appendix; Noble, 1963, personal communication). Nearby in the Pulni Hills, Noble

obtained a lot of amaranth seeds intended for popping; when grown out, they proved to be a mixture of *A. hypochondriacus* and *A. caudatus* (Appendix). In Suiyan province, Inner Mongolia, a field planted to *A. caudatus* was seen in 1944 (Nakao, 1957, p. 409).

The only other area where the species is known in folk cultivation is Ethiopia. The older specimens are all dark seeded and are not known to represent a regular grain crop. The earliest known collection (Pearce s.n., ca 1815, Tigre, BM) was said by Pearce to be the most beautiful flower he had seen in Abyssinia. He noted that the Abyssinians parched the seeds and ate them for complaints in the stomach and breast; the name was *Tsellal Enno Mariamm* (parasol of the Virgin Mary). This name was reported for other specimens from Tigre (Schimper 359, 1077, 1513, 1535, 1837-44, nr Aduwa, BM, G, GH, K, MO, P, US). There have been later collections of the same dark seeded form from Ethiopia (e.g. Cooper s.n., 1926 Addis Alam, Shoa Prov, K) and from the Sudan (Lynes 596, 1921, Darfur Prov, US), but none have data on use. Finally, near Jimma in 1957, Anderson found that *A. caudatus* grain is eaten popped and milled and the inflorescences are used to decorate the cross for Mascal Day processions; forms with both dark and pale, reddish tinged seeds were collected (Anderson, 1957, personal communication; Appendix). The plants are allowed to seed themselves and also sown along field edges and in rubbish heaps by houses. The seed was said to have been brought originally from the Maji forest region, where the Ghimera regularly cultivate it as an important grain. Meyer subsequently collected pale, reddish tinged seeds of *A. caudatus* in the forest districts of southwestern Ethiopia, where it is a grain of Negro tribesmen (Appendix).

Amaranthus caudatus as a Cosmopolitan Ornamental.

It is certain that some pale seeded American grain amaranths had been introduced to European gardens during the 16th century (Gesner, 1561, p. 246; Gerarde, 1597, p. 254,) and were soon widely grown as ornamentals and for medicinal uses inspired by their blood red color. It is possible that *A. caudatus* was the only American amaranth planted in Europe during the 16th and 17th centuries, but this is not certain. The distinctive form of *A. caudatus* that was to become the common ornamental was first clearly described by Parkinson (1640, p. 753) and Ray (1686-88, 1: 202). This has since gone around the world, often in commercial seed packets, and is still widely planted, especially in temperate zone gardens. Its peculiar English name, love-lies-bleeding, seems to be a Victorian invention. In other languages it shares names such as red-hot-cattail, fox-tail, or scourge-of-the-nun with the unrelated but curiously similar chenille plant, *Acalypha hispida*.

DISCUSSION AND CONCLUSIONS

Amaranth domestication may have begun, as has been repeatedly suggested, with the very beginnings of American Indian agriculture. Some arguments for early domestication, such as the central role of the crop in pre-Conquest Mexican ceremonials, are fairly convincing but they are not based on direct evidence. So

far, archaeologic amaranth seeds that are known to be very ancient may have been merely gathered. In both North and South America, finds of definitely domesticated grain go back only to late prehistoric times.

It has been more or less taken for granted that each grain species was separately domesticated in a particular region and period, then carried into other regions and passed down through time like a uniquely invented culture trait. Some alternative possibilities have not been ruled out, one being multiple domestications of the same wild species. The progenitors of the grain amaranths would seem to be ideal candidates for repeated domestication, being naturally wide ranging, weedy, and obviously useful plants. However, what little variation there is within the domesticated species does not suggest an old heritage from distinct geographic races so much as it does recent introgression.

Another conceivable possibility is derivation of two or even all three grain species from a single primary domesticate. For example, *A. cruentus* might have been domesticated from *A. hybridus* in humid regions of Central America and then carried northwestward into drier highlands, where it picked up *A. powellii* as a weed. By continued crossing with *A. powellii*, the Mexican grain crop might eventually have come to resemble it more than its original progenitor. Similarly, southward carriage of *A. cruentus* followed by repeated crossing with *A. quitensis* might have produced the distinctive Andean grain crop, assuming that *A. cruentus* and *A. quitensis* can interbreed, which is not proven.

The main reason for considering such a speculative connection between domesticated species is that it would account very simply for some peculiar characters shared by all three. Of these, the pale seed character seems hardest to explain by convergent evolution in three independent evolutionary lines. Mutants producing pale seeds have never been recorded in any wild amaranth species nor in the dark seeded ornamental forms of the grain species. It would be worth knowing whether the pale seed character is genetically homologous in the domesticated species, but this has not been investigated.

Thus, although alternatives should be kept open, it is still possible to maintain the simplest, most obvious hypothesis, namely that the three grain species were independently domesticated by different prehistoric peoples of North and South America.

As for the intriguing problem of when and how the species were introduced to the Old World, the evidence remains inconclusive. There is no proof that any of them were in the Old World before Columbus. On the other hand, their spread in Asiatic and African cultivation certainly outran European contacts and could scarcely have been initiated by any direct transfer between Old and New World colonies of the same European power. Introduction through Europe itself seems most likely in the case of the Andean *A. caudatus*. Pale seeded forms evidently were taken there directly from South America in the 16th century, long before they were found in Asia or Africa. However, dark seeded forms that are minor components of the Andean crop somehow became established in remote parts of Asia and Africa before they were known in Europe.

The Mexican *A. hypochondriacus* and the Central American *A. cruentus* evi-

dently reached Europe in the 18th century, both arriving via Asia and directly from America. Europe got only dark seeded forms that are inferior as grain and grown mainly as potherbs and ornamentals. The pale seeded forms of *A. cruentus* apparently never left Central America but pale seeded *A. hypochondriacus* had reached Asia by the 18th century. At least since the early 19th century, *A. hypochondriacus* has been a widespread and locally important grain crop there. At present, India alone undoubtedly harvests more grain from this one species than is produced by all the relics of grain amaranth cultivation in the New World.

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APPENDIX: GRAIN AMARANTH SPECIMENS EXAMINED

Specimens cited are either reported as grown for grain or are pale seeded forms from known grain amaranth regions. (The only other pale seeded specimens belong to the common ornamental race of *A. caudatus*.) Collections of the author are indicated by J.D.S.

Notations between hyphens:

- G: grain use specified
- N: grain use not noted
- d-: seeds dark
- p-: seeds pale
- i-: seeds immature
- @: strongly atypical, apparently hybrid

Amaranthus hypochondriacus

AMERICA. GUATEMALA. ALTA VERAPAZ: Pittier 197 (in 1905), nr Secanquim -Np- (US).

MEXICO. CHIHUAHUA: Gentry 1843, 1844 (in 1935), Warihio Indian village, Guasaremos, guegui -Gp- (MO, UC, US); Gentry s.n. (in 1948), seed from Rancho Trigo, Sierra Chamco, bledo or guegui—progeny: J.D.S. 1193 -Gp- @ (MO, WIS). Pennington 269 (in 1960), Tepehuan settlement nr Santa Rosa, giage or gualle -Np- (WIS). DISTRITO FEDERAL: Martinez s.n. (in 1917), alegria -Gp- (US). Bravo s.n. (in 1940), seed from Valley of Mexico, alegria—progeny: Hunziker 2948 -GP- (GH). Kelly s.n. (in 1947), betw Xochimilco & Tlahuac -Gp- (UC). J.D.S. 1171 (in 1947), San Gregorio Atlapulco, alegria -Gp- (F, GH, MO, UC, US, WIS). GUERRERO: Hernandez X. 3166 (in 1947), seed from Chilapa, alegria—progeny: J.D.S. 1162 -Gp- (F, GH, MO, UC, US, WIS). JALISCO: Palmer 694, 695 (in 1886), Guadalajara, alegria -Gp- (K, MICH, US). J.D.S. 1174 (in 1947), Tlajomulco, alegria or zoale -Gpd- (F, GH, MO, UC, US, WIS). MEXICO: Hinton 2137 (in 1932), Temascaltepec, alegria -Np- (K, MO, US). MICHOACAN: West s.n. (in 1946), seed from Teremendo, Zacapu pati or alegria blanca—progeny: J.D.S. 1170 -Gp- (DS, MO, UC, US, WIS); West s.n., seed from Opopeo, alegria blanca—progeny: J.D.S. 1274 -Gp- (WIS); West s.n., seed from Los Reyes highlands, Pomatacuaro, alegria negra—progeny: J.D.S. 1355 -Gd- @ (MO, WIS). OAXACA: C. O. Sauer s.n. (in 1945), seed from Zapotec village of San Juan nr Ixtlan de Juarez, alegria—progeny: Reed s.n. -Gp- @ (UC) and J.D.S. 1161 -Gpd- @ (MO, TENN, WIS). J.D.S. 1266 (in 1947), Clavillones in Zimatlan area, alegria -Gp- @ (MO, WIS). PUEBLA: C. O. Sauer s.n. (in 1948), seed from San Jeronimo Teocuizmanalco nr Tezmelucan, alegria—progeny: J.D.S. 1239 -Gp- (WIS). SINALOA: Gentry 6547 (in 1941), Quebrada de Manzana, Sierra Surotato, bledo -Gi- (MO). TLAXCALA: J.D.S. 1173, 1277 (in 1947), San Miguel del Milagro, alegria -Gp- (DAV, F, GAT, GH, MO, UC, US, WIS). Hernandez X. 3715 (in 1948), seed from San Bernabé Amaxac, alegria—progeny: J.D.S. 1535 -Gp- (F, GH, MO, UC, US, WIS).

UNITED STATES. ARIZONA: (Archaeologic specimens noted in text.) Powell s.n. (ca 1870), seed from Arizona Indians—progeny grown at Harvard Univ -Gp- (GH, MO, US).

ASIA. BHUTAN. Cooper 2759 (in 1914), Punakha -Np- (E); Cooper 2501, 3363, s. loc. -Np- (E).

CEYLON. Koenig 29 (ca 1780), s. loc., ette tampala -Gp- (L). Macrae 837 (ca 1830), s. loc. -Np- (BM). Brodie 101 (ca 1850), 101 s. loc. -Np- (E). Thwaites s.n. (in 1860), Tricomalee -Np- (K). Deschamps s.n. (in 1890), Teldeniya, rana tampala -Np- (G).

CHINA. HEILUNGKIANG: Dorsett & Dorsett 4089 (in 1925), Hsiaoling -Np- (UC, US). HOPEH: Beach s.n. (in 1948), Hsin Chi -Gp- (UC). HUPEH: Henry 2390 (ca 1885), Patung dist, jua-ku -Np- (K); 2732, Ichang, jua-ku -Np- (BM, K, US); Henry 4808, s. loc. -Np- (GH). CHOW 1294 (in 1934), Chienshih -Np- (E). KIREN: Hanelt 6014 (in 1958), experiment station, Tung Hua -Gp- (GAT, WIS). KWEICHOW: Tsiang 5946 (in 1930), Yunfou-shan, Tuyan -Np- (K). Steward et al. 784 (in 1931), Fan Ching Shan, Ta Ho Yen -Npd- (GH, K, L, US). SHENSI: Rev. Fr. Hugh s.n. (about 1900), Isay Toe, Pao Chi -Np- (BM). SZECHWAN: Hosie s.n. (in 1904), betw Batang & Tachienlu -Np- (K). Yü 14480 (in 1937), Muli, Wachin, Shawan -Np- (E). Chang s.n. (in 1948), seed from Muping—progeny: J.D.S. 1489 -Gp- (F, GH, MO, UC, US, WIS); Chang s.n., seed from Mowhsien—progeny: J.D.S. 1484, 1499 -Gpd- (DAV, F, GH, MO, UC, US, WIS). YUNNAN: Ward 3522 (in 1919), Imaw Bum to Hpimaw, yü-mi -Gp- (E).

INDIA. Without province: Roxburgh s.n. (ca 1800), -Gp- (K). Wallich 238 (in 1815), -Gp- (BM). Royle s.n. (about 1830), NW India -Np- (K). Ritchie 631 (ca 1840), -Np- (E, GH). Simpson s.n. (ca 1840), Himalaya -Np- (G). Wight s.n. (ca 1840), -Np- (UC, W). Edgeworth s.n. (in 1844), NW India, batou -Gp- (K). Falconer 823 (ca 1850), -Np- (K). Gamble 2028A (in 1876), -Np- (K). BIHAR: Buchanan-Hamilton 2028-1 (in 1813), (Wallich 6903), Bhagalpur -Gp- (E, P). HIMACHAL PRADESH: Lady Dalhousie s.n. (in 1831), Simla -Np- (E). Thomson s.n. (in 1847), Serahan, Sutlej Valley -Gp- (K). Grant s.n. (about 1850), Kunamer, Sutlej Valley -Np- (K). Drummond 26070 (in 1886), Simla Hills -Np- (K). Lace 1483 (in 1896), Chamba -Np- (E). Harsukh s.n. (in 1899), Pangti, Sauch Valley, Chamba -Np- (K). Koelz 7279 (in 1933), Li, Bashahr -Gd- (G, US). MADRAS: Wight s.n. (ca 1850), s. loc. -Np- (E); Wight 1787, Dindigul Hills -Np- (E); Wight 2436, Kothagerry -Np- (K). Cleghorn s.n. (in 1859), Kalhatti -Np- (E). Barber 8603, (in 1910), Dhimbarr, Coimbatore -Npd- (K). Noble s.n. (in 1962-63), seed and plant collections from six Badaga villages, Upper Nilgiri Hills—progeny: J.D.S. 3954, 3955, 3965 -Gpd- (WIS); Noble s.n., seed and plant collections from three Kurumba villages, Manjakombai area, Upper Nilgiri Hills—progeny: J.D.S. 3949, 3950, 3953, 3956, 3960, 3961 -Gpd- (WIS); Noble s.n., seed and plant from Kodomalai Estate, nr Coonor, Upper Nilgiri Hills—progeny: J.D.S. 3952 -Gp- (WIS); Noble s.n., seed from Irulas tribe, Caricure, Nilgiri Hills—progeny: J.D.S. 3957, 3959 -Gpd- @, 3958 -Gp- (WIS); Noble s.n., seed from Vilpatti, Pulni Hills—progeny: J.D.S. 3963 -Gp- (WIS). MAHARASHTRA: Tyson 30 (in 1953), seed from Poona—progeny: J.D.S. 1703 -Np- (MICH, MO, UC, WIS). Gentry 37440 (in 1954), seed from Poona—progeny: J.D.S. 2538 -Np- (WIS). Kelly s.n. (in 1960), nr Ajanta, Aurangabad, raj-giira -Gp- (WIS). PUNJAB: Stewart 1790 (in 1917), nr Pathankot, Ravi Valley -Np- (K). UTTER PRADESH: von Hügel 158, 409 (in 1832), Mussoorie -Np- (W). Ritchie s.n. (ca 1840), Saharampore -Np- (E). Madden 583 (ca 1845), Bashahr to Kumaon -Gp- (E). Anonymous s.n. (in 1846, 1848), Saharampore -Np- (K). Strachey & Winterbottom 2b (ca 1850), Kumaon -Np- (GH, K). von Schlagintweit 9707 (in 1855), Nelong to Ussila, Garhwal -Np- (E). Gamble 27404, 27432 (in 1898), Jaunsar, chaulai -Np- (K). Bell s.n. (in 1902), Banda, ranidana -Gp- (K). Anderson s.n. (in 1915), Mussoorie -Np- (E). Huggins s.n. (in 1952), seed from Harsil, Tehri Garhwal, marcha—progeny: J.D.S. 1702 -Gp- (MICH, MO, WIS). Lal s.n. (in 1961), Mussoorie, chaulai—progeny: J.D.S. 2845 -Gp- (WIS). Andress s.n. (in 1963), Mussoorie, chaulai—progeny: Frenkel 889, 890 -Gd- (WIS).

KASHMIR. BALTISTAN: von Schlagintweit 871 (in 1856), nr Skardo -Np- (L, UC); von Schlagintweit 872, nr Skardo -Np- (BM, US); von Schlagintweit 5789, Kunes via Kiris to Neru -Np- (BM, US); von Schlagintweit 5850, Kunes via Kiris to Neru -Np- (E); von Schlagintweit 6407, Das via Goltere/Naugaum to Hasora/Astor -Np- (US). GILGIT: Harlan 806 (in 1960), seed from Shimal garden nr Gupis, Teru, gunerie—progeny: J.D.S. 3966 -Gp- (WIS). KASHMIR: Thomson s.n. (in 1848, 1849), s. loc. -Np- (K). Aitchison s.n. (in 1875), s. loc. garhar or sil -Gpd- (K). Polunin 300 (in 1956), Tangmarg -Gd- (MO, WIS); Polunin 617, Rezan, Sind Valley -Gpd- (MO, WIS); Polunin 759, Khanan, Wangat Nullah -Gd- (MO, WIS); Polunin 804, nr Miragund -Gpd- (MO, WIS); Polunin 819, Srinagar -Gpd- (MO, WIS). LADAK: H. & R. von Schlagintweit 1771 (in 1856), Himis lamasery, nr Leh -Np- (BM); H. & R. von Schlagintweit 1958, Yugah to Leh -Np- (GH); H. & R. Schlagintweit 12075, Gures across Uri plain to Bandipur -Np- (GH).

NEPAL. Wallich s.n. (in 1821), s. loc. -Np- (K, P, W). Janaki-Ammal 1482 (in 1948), seed from Makwanpur, nr Sirsagarhi—progeny: J.D.S. 1495 -Gpd- (F, GH, MO, UC, US, WIS). Nakao 194 (in 1953), seed from Tsumje, S slope of Sringi Himal—progeny: J.D.S. 1713 -Gp- (MICH, MO, WIS); Nakao 203, seed from Thomje, Shiar Kola Valley—progeny: J.D.S. 1714 -Gp- (MO, UC, WIS). Tyson 20 (in 1953), Chainpur, Seti Valley, marcha -Gp- (MO).

SIKKIM. Hooker s.n. (in 1849), Lachen, Lachoong -Np- (K); Hooker s.n., s. loc. -Npd- (BM, E, GH, K, W).

SOVIET RUSSIA IN ASIA. MARITIME TERRITORY: Bohnhof s.n. (in 1898-99), Lake Khanka -Np- (E, K).

AFRICA. UGANDA (not mapped). MASAKA: Purseglove 1775 (in 1945), Kakuto, Buddu -Gp- (K). Thomas 4494 (in 1946), Bawanga -Gp- (K).

Amaranthus cruentus

AMERICA. GUATEMALA. ALTA VERAPAZ: J.D.S. 1265 (in 1947), nr Cohan, *bledo* or *tse* -Gd- (DAO, F, GH, MO, UC, US, WIS). CHIMALTENANGO: J.D.S. 1168 (in 1947), San Martín Jilotepeque, *bledo blanco* -Gpd- (DS, F, GAT, GH, TENN, UC, US, WIS); J.D.S. 1240, 1267, San Martín Jilotepeque, *bledo morado* -Gd- (DAV, MO, WIS). GUATEMALA: J.D.S. 1176 (in 1947), San Juan Sacatepequez, *nigua negra* -Gpd- (DAO, GH, MO, US, WIS); J.D.S. 1177, San Juan Sacatepequez, *nigua blanca* -Gp- (DAV, F, UC); J.D.S. 3972 (in 1966), San Juan Sacatepequez, *nigua negra* -Gd- (WIS).

MEXICO. OAXACA: Kaplan s.n. (in 1954), seed from Mixtec village, Jicatepec, *chian*—progeny: J.D.S. 2529 -Gp- @ (WIS). PUEBLA: J.D.S. 1172 (in 1947), Acatlan, *alegría* -Gp- @ (GH, MO, UC, US, WIS). SINALOA: Palmer 1718 (in 1891), Ymala, *guaute* -Gp- @ (US).

Amaranthus caudatus

AMERICA. ARGENTINA. SALTA: Mintzer s.n. (in 1938), seed from San Carlos, *quinoa*—progeny: Hunziker s.n., 1085 -Gp- (G, GH, US). Lovaglio 1449 (in 1941), seed from Cachi, *quinoa*—progeny: Hunziker 2127 -Gp- (G, GH). Hunziker 3003 (in 1943), San Carlos, *quinoa* -Gp- (MO). Anonymous DEIP-17007 (in 1958), seed from Coronel Moldes experiment station, *chacion*—progeny: Grant 336 -Np- (WIS). TUCUMAN: Hunziker 2550, 2555, (in 1943), Colalao del Valle, *chacion* or *quinoa de Castilla* -Gp- (G, K).

BOLIVIA. COCHABAMBA: Cardenas 3512, 3514, 3515, (in 1944), Cochabamba, *millmi* -Gp- (GH, US); Cardenas s.n. (in 1947), seed from Sacaba, *millmi*—progeny: J.D.S. 1314, 1315 -Gpd- (UC, WIS). Cutler s.n. (in 1947), seed from Hacienda Chihuni, nr La Angostura, *millmi*—progeny: J.D.S. 1179, 1241, 1298 -Gpd- (DAV, DS, F, GAT, GH, MO, TENN, UC, US, WIS). Fuller s.n. (in 1947), nr Cochabamba, *millmi* -Gp- (ILL). LA PAZ: Kelly 1006 (in 1958), seed and plant from betw Chulumani & Irupana, *kwimi*—progeny: J.D.S. 2540 -Gpd- (UC, WIS); Kelly s.n., Chirca—progeny: J.D.S. 2539 -Np- (WIS); Kelly s.n., Tajma, Chulumani region, *quinoa*—progeny: J.D.S. 2542 -Np- (WIS). TARIJA: Figueroa s.n. (1941), Tarija, *coimi*—progeny: Hunziker 2128 -Np- (GH).

ECUADOR. AZUAY: Heiser 6554 (in 1966), nr Cuenca, *quinoa* -Gp- (IND, WIS).

PERU. ANCASH: Bradford s.n. (in 1955), Hacienda Vicas above Chancos, *achi* or *achita* or *cuipa* -Np- (USM). AYACUCHO: Gade s.n. (in 1964), nr Ayacucho, *achita* -Gd- (WIS). CUZCO: Cook & Gilbert 256 (in 1915), Urubamba, *quihuicha* -Gp- (US). Vargas s.n. (in 1939), seed from Cuzco, *quihuicha*—progeny: Hunziker 810 -Gp- (US); Vargas s.n. (in 1943), seed from Cuzco, *quihuicha*—progeny: Cardenas 3513 -Gp- (GH). Gade s.n. (in 1964), Naihua, bottom of Apurimac gorge, *quihuicha* -Gd- (WIS). HUANCAYELICA: Arevalo s.n. (in 1948), seed from La Mejorada, *achita*—progeny: J.D.S. 1283 -Gpd- (DAV, F, GH, MO, UC, US, WIS).

ASIA. AFGHANISTAN. Without province: Griffith 4184 (about 1840), -Np- (GH).

CHINA. HUPEH: *Henry* 7517 (about 1885), Changyang -Np- (K). KUIN: *Komarov* H-165 (in 1896), s. loc. -Np- (K). *Kozlov* 14486 (in 1929), s. loc. -Np- (W). *Chen* 369 (in 1931), nr Kirin -Np- (GH). LIAONING: *Webster* 230 (in 1884), Mukden to Yalu River -Np- (K). SZECHUAN: *Yü* 14479 (in 1937), Muli, Wachin—progeny: *Cowgill* 2087 -Np- (E, GH). *Chang* s.n. (in 1948), seed from Mowhsien, progeny: *J.D.S.* 1503 -Gp- (F, GH, MO, UC, US, WIS). YUNNAN: *Maire* 319 (in 1906), Yunnansen -Np- (E). *Handel-Mazzetti* 8479 (in 1915), Mekong Valley, $27\frac{1}{2}^{\circ}$ N.L. -Np- (E). *Ten* 1429 (in 1919), Pai Yen Ching -Gp- (W).

INDIA. Without province: *Edgeworth* 85 (in 1844), NW India -Np- (K). HIMACHAL PRADESH: *Lace* s.n. (about 1900), Bashahr -Np- (E). MADRAS: *Noble* s.n. (in 1962), seed from Kurumba villages, Manjakombai, Upper Nilgiri Hills—progeny: *J.D.S.* 3951, 3962 -Gp- (MO, WIS); *Noble* s.n., seed from Vilpatti, Pulni Hills—progeny: *J.D.S.* 3964 -Gp- (WIS). UTTAR PRADESH: *Buchanan-Hamilton* 2028-2 (in 1813), Belaya -Np- (E). *Jameson* 776 (in 1845), Mussoorie -Np- (K). *Madden* s.n. (about 1850), Mussoorie -Np- (E). *Strachey & Winterbottom* 2a (about 1850), Kumaon -Np- (GH). *King* s.n. (in 1869), nr Mussoorie -Np- (L). *Anderson* s.n. (in 1915), Mussoorie -Gp- (E).

KASHMIR. BALTIKISTAN: *von Schlagintweit* 5787 (in 1856), NE of Skardo -Np- (US).

NEPAL. *Wallich* s.n. (in 1821), s. loc. -Np- (G, K, P). *Janaki-Ammal* 1481 (in 1948), seed from Makwanpur, nr Sirsagarhi—progeny: *J.D.S.* 1505 -Gp- (MO, UC, WIS). *Nakao* 188, 191, 201, 205 (in 1953), seed from Ulleri, SW slope of Annapurna—progeny: *J.D.S.* 1707-1710 -Gp- (F, GH, MICH, MO, UC, US, WIS); *Nakao* 204, seed from Ghara, W slope of Annapurna—progeny: *J.D.S.* 1712 -Gp- (MICH, MO, WIS); *Nakao* 210, seed from Sikha, SW slope of Annapurna—progeny: *J.D.S.* 1711 -Gp- (WIS).

AFRICA. ETHIOPIA: (not mapped). ILUBABOR: *Meyer* 8905 (in 1964), Tuke, nr Teppi -Gp- (WIS). KEFA: *Anderson & Getachew* s.n. (in 1957), nr Jimma, lishalisho or kettilla -Gdp- (WIS). Mengesha s.n. (in 1957), Missan Telleri -Gp- (WIS).

November 27, 1975

Hon. George S. Pillsbury,
143 State Office Building,
St. Paul, Minnesota 55155.

Dear George:

Thank you for your good letter. The new job is going to be extremely difficult and controversial, and of course it will take me totally out of politics. But that's okay. My three years in foreign affairs has taught me that a strong capability is most important.

I was delighted to hear of your visit to London and Ireland. It surprises me not that Curley is an immediate hit in Ireland. He'll do a fantastic job.

I was disturbed by the reaction of the Minnesota delegation who came here to China. I was also disturbed by a comment in Ed Wilson's letter to you where he said, "I believe he (George Bush) and his staff missed an opportunity to brief and debrief us as well as having left an unpleasant sense of discourtesy in the minds of most members of the delegation." George, I wasn't even in China then. I left a note for Wendell Anderson which was delivered to him telling him that I had to leave for the United States with a congressional delegation.

I would appreciate very much your helping us to set the record straight. I have asked our very able DCM, Harry Thayer, for a rehash on exactly what happened, and here's what he has told me:

First, I cabled Wendell Anderson asking him to call as soon as the delegation got to Peking. They did not do that; and it is almost impossible to know when people are here in Peking if they don't call us.

A person from the Danish Embassy ran into one of the Minnesota delegation at a shop in Peking, and the member of the delegation, who had not called USLO, complained to the Dane about lack of hospitality. The Dane immediately called Harry Thayer and told him that the group was here. Thus Harry located the group at the hotel and immediately sent a letter of welcome down to Governor Anderson.

About an hour later, Governor Anderson called. Harry welcomed him and Anderson said something to the effect that "I'm sorry we didn't call but I was somewhat embarrassed. I didn't want to bother you."

Harry invited the Governor to USLO, and within an hour Governor Anderson and one other man came. They chatted about the issues of the day. Harry invited the delegation for drinks at his house.

(Please bear in mind that Barbara and I were both out of town and the USLO residence was therefore not in action.)

It was not convenient for the delegation to come to Harry's apartment for drinks, so he, Bill Thomas (Chief of our Economic Section), and Lynn Pascoe (Political Officer) went down and joined the delegation for a drink, bearing with them a couple of bottles of gin.

The delegation left the next morning, and Harry took the two-hour round-trip to the airport to see them off.

I would appreciate very much, George, your passing this along to the people who have raised the matter with you.

Incidentally, the date of my cable to the Governor was August 25, and Harry's letter to the Governor, delivered to the hotel, was September 5 -- the same day Anderson came to USLO.

Our people here pride themselves, and I think justifiably so, on being hospitable to visiting Americans, and I am very, very sorry that there is this feeling on the part of the Minnesota delegation that we were discourteous to them.

I do appreciate your raising this with me, because I would like to set the record straight. If the above description of activities does not coincide with the recollections of Mr. Wilson and others, I would really appreciate your letting me know. Harry Thayer is one of the most conscientious men I have ever met and he has an innate sense of what is right or wrong. Perhaps you remember him, although he was behind you at Yale. His Mother was one of the famed Talbot sisters. In any event, I have never known him to be discourteous, and I have always known him, in my years of service with him, to walk the extra mile in trying to be helpful to people. So I really would appreciate your help in this matter.

It's always good hearing from you. I value your friendship and your frankness.

Most sincerely,

George Bush

GEORGE S. PILLSBURY

Senator 42nd District
1320 Bracketts Point Road
Wayzata, Minnesota 55391
(612) 478-9634

Offices:

143 State Office Building
St. Paul, Minnesota 55155
(612) 296-4121
930 Dain Tower
Minneapolis, Minnesota 55402
(612) 338-3873

Senate

State of Minnesota

November 5, 1975

1. cabled Andy asking
him to call - didn't do it.

2. Danish told us they
were there - located in
at Hotel - sent letter down 1975

The Honorable George Bush
United States Envoy to the
People's Republic of China
Peking
Department of State
Washington, D.C. 20520

Dear George:

3. I have later been called - encourage
to call
not bother

Congratulations and welcome home! Contrary to what the media is say-
ing and others who are looking for ulterior motives, I think that Presi-
dent Ford's decision to put his own men on his team was a very positive
one and a plus for 1976 and beyond.

My golf game with the President did come off on schedule, and of
course, was great fun. You might be amused by the enclosed article
that my partner leaked to the press.

Sally and I had a great trip in Europe, particularly seeing Vienna
and Budapest with Jane and Stan, staying with Cord and Starke in London,
and ending with a couple of nights in Dublin with the Curleys. As you
can well imagine, the Irish already love them.

With legislative and political activities accelerating, no more foreign
trips for at least a year or so. So we shall not be pushing for our
China visas for the time being--maybe in 1977.

Speaking of China, have visited with three of the Minnesota Delegation
that were with Governor Anderson and each one has spoken to me about
how perplexed they were that your office all but ignored them relative
to what they understood it was doing for most United States groups.
Knowing that such would be completely contrary to your style, I asked
Ed Wilson to write me the enclosed letter which I could pass on to you.
The others who commented on this apparent oversight were Atherton Bean,
an especially generous supporter of the Republican Party and its candi-
dates, and George Dixon, another good citizen. If there was a break-
down in communications, particularly because of the suddenness of this
trip, possibly one of your associates could send me an explanation with
which I could respond to at least these three members of the Delegation.

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The Honorable George Bush

- 2 -

November 5, 1975

Again, heartiest congratulations and best wishes with your new assignment. I shall have to send another letter to the President reiterating my recommendation for vice presidential candidates now that the incumbent is no longer a candidate.

Our love to Barbara,

Sincerely,

A handwritten signature in dark ink, appearing to read "George", with a long horizontal flourish extending to the right.

GSP:gl
Enc.

THE PILLSBURY COMPANY

EXECUTIVE OFFICES
MINNEAPOLIS, MINNESOTA 55402

E. B. WILSON
VICE PRESIDENT AND GENERAL MANAGER
INTERNATIONAL

134 6 1535

October 29, 1975

Mr. George S. Pillsbury
Sargent Management Company
930 Dain Tower
Minneapolis, Minnesota 55402

Dear George:

Your letter of October 22 asks for the names of those individuals who were members of the Minnesota delegation to the PRC and the dates we were in Peking. The individuals were:

Carl Johnson	- Minnesota State Representative - Chairman of the Education Committee of Minn. House of Representatives - Grain and dairy farmer
Burton Joseph	- President of I. S. Joseph Company
Geri Joseph	- Columnist for the Minneapolis Tribune
William Keye	- Vice Chairman of the Board, Control Data
David Lebedoff	- Minneapolis attorney and author
Dr. Emmerson Ward	- Chairman of the Board of Governors, Mayo Medical Clinic in Rochester
Atherton Bean	- Chairman of the Executive Committee, International Multifoods, Inc.
George Dixon	- President, First National Bank of Minneapolis
Wayne Thompson	- Senior Vice President, Dayton-Hudson Corp.

Mr. George S. Pillsbury
October 30, 1975
Page 2

Dr. Vernon Sommerdorf - Family physician
- Former Minnesota state representative

We were in Peking on Friday, August 29, and then from September 3-5.

As I have said, George, I think that the cause of the mix-up was largely poor staff work in the Liaison Office as it would be difficult to attribute the event to other motives. I am sure that George Bush will want to know what happened and why. I believe he and his staff missed an opportunity to brief and debrief us as well as having left an unpleasant sense of discourtesy in the minds of most members of the delegation.

If I can be of further help, please let me know.

Sincerely,

A handwritten signature, likely "E. B. Wilson", written in dark ink. The signature is stylized with a large, bold "E" and a smaller "B" and "W" following it.

EBWilson/sk

May 6, 1975

Mr. Tully Plessner,
President,
Cambridge Opinion Studies, Inc.,
625 Madison Ave.,
New York, N.Y. 10022.

Dear Tully:

I received your letter of April 25 just yesterday. In most instances I am not able to be helpful with visas, darn it! We are occasionally given house guest privileges, but in May we have every sack filled by at least one body. On May 12 four couples, including Secretary Roger Morton, will arrive as our guests.

For future reference, there is another problem, and that is that it takes at least three weeks from the time the papers arrive in Washington to get visa approval.

I hope things are going well with you. It would have been great to see you...it isn't much of a hop over from Tokyo. I like this new job enormously, but I can't say I don't miss politics.

Yours very truly,

George Bush

Cambridge
Opinion
Studies, Inc.

*write
Tom M. Shultz*

April 25, 1975

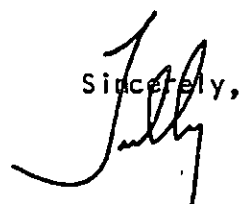
TULLY PLESSER
PRESIDENT

Ambassador George Bush
Chief; U.S. Liaison Office
Peking, Peoples Republic of China
c/o Department of State
Washington, D.C. 20520

Dear George:

I may find myself in Tokyo during the week of May 12 and am anxious to know the possibility of visiting Peking at that time. I recognize that this is relatively short notice, but if it could be arranged, I would certainly enjoy visiting your adopted city and getting together with you and Barbara.

Best wishes.

Sincerely,


TP/pz

Photocopy from George Bush Presidential Library

Rand
SANTA MONICA, CA. 90406

December 22, 1975

K To
done 3/27/84 PM
1. Give Jim Lilley
2. no reply to Pillsbury
GB

The Honorable George Bush
U.S. Liaison Office
Peking, China

Dear Ambassador Bush:

In response to your request to know about reactions to my article in *Foreign Policy*, I am sending you copies of some press comments. There has been general acceptance except from Radio Moscow which at least noted that the article was "approved by the American press."

If you would like to have copies of future media comment, please let me know.

Happy New Year!

Mike Pillsbury

Mike Pillsbury

MP:mlt

Enclosures: Press comments

SECRET
AMB

September 25, 1975

Mr. Mike Pillsbury,
The Rand Corporation,
1700 Main Street,
Santa Monica, Cal. 90406.

Dear Mike:

Pardon my delay in answering your letter.
I just returned from consultations in Washington.

I discussed the matter of your papers with
EA/PRCM at State, and they have agreed to for-
ward to us copies of everything you send them.
This should make it easier for you.

Many thanks for thinking of us.

Yours very truly,

George Bush
Chief, US Liaison Office

~~CONFIDENTIAL~~
ATTACHMENT

TO: EA/PRCM - Mr. Armstrong

Oscar, I got two letters from this guy,
and this is how we have handled the
matter.

GB

Enclosures

9-25-75

Rand
SANTA MONICA, CA. 90406

11 September 1975

SEP 24 1975

The Honorable George Bush
Chief
U.S. Liaison Office
Peking, People's Republic of China

Dear Ambassador Bush:

Did you receive my letter of July 18 with enclosures about recent Sino-Soviet conversations? I was about to send you another report when I found that you are one of the few who has not requested future copies.

Since I have been asked to keep the distribution extremely limited, please let me know if these summaries are of interest to you.

Sincerely,

Mike

Mike Pillsbury

MP:sje

*Orig. ltr. was answered in your absence
by HT destroyed*

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PER E.O. 12958, SEC. 3.3 (C)
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AUG 21 1974

The Honorable George Bush
Chief
U.S. Liaison Office
Peking, People's Republic of China

Dear Ambassador Bush:

In 1973-74, I sent copies of occasional conversations held with Chinese diplomats in the United States to Al Jenkins and the China Desk on a personal basis.

If you are interested in continuing to receive these summaries, please let me know. Generally, I have been keeping most of them for my own research use since last fall because they are of limited, background interest, but these two seemed particularly topical and interesting.

Best regards,

Mike Pillsbury
Michael Pillsbury

MP:mc

Encl.(2): Attachment to L-78, Summary of Twelfth Meeting at Chinese Liaison Office, Washington, D.C., July 1, 1975 (U), Confidential.

Attachment to L-83, Summary of Conversation with Soviet Sinologist at UN Secretariat, New York, June 30, 1975 (U), Confidential.

If enclosures are withdrawn or not attached the classification of this correspondence will be cancelled.

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Attachment to L-78

dated 7/11/75

The RAND Corporation
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SUMMARY OF TWELFTH MEETING AT CHINESE LIAISON OFFICE
WASHINGTON, D.C., JULY 1, 1975 (U)

Mike Pillsbury

11 July 1975

DD Form 254 dated 7/22/74
for Contract F44620-73 C-0011
AF/IN - XGDS-2

Classified by _____
EXEMPT FROM GENERAL DECLASSIFICATION
SCHEDULE OF EXECUTIVE ORDER 11652
EXEMPTION CATEGORY 2
DECLASSIFY ON December 31, 1990

NATIONAL SECURITY INFORMATION
Unauthorized Disclosure Subject to
Criminal Sanctions

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SUMMARY OF TWELFTH MEETING AT CHINESE LIAISON OFFICE
WASHINGTON, D.C., JULY 1, 1975 (U)

In accordance with established procedures, this memorandum of conversation has been given the overall classification of Confidential/NoForm to protect the relationship reported herein.

At the invitation of Ch'ien Ta-yung* extended at our last meeting I arrived at the Liaison Office for dinner at 6:30 p.m. with Ch'ien and his colleague Hsu Shang-wei.** During the two and a half hour conversation, Hsu asked four questions:

- 1) In light of Vice Premier Teng Hsiao-p'ing's recent statement to the American society of newspaper editors, had the pressure against President Ford's trip to Peking this fall now been reduced? Senator Goldwater, Hsu added, has said that Ford may go to China as long as he does not sell out old friends.
- 2) Does the American military oppose this trip by your President?
- 3) In the case of high level American military visitors to Asia, must the State Department approve? For example, Hsu asked, when your Admiral Noel Gayler visited Taiwan recently, did this visit require approval by the State Department?
- 4) Why has the American press not reported the alleged speech by Chiang Ch'ing (Mrs. Mao) that Taiwan has released?

*Ch'ien Ta-yung is about fifty, Shanghai-born, and has participated in the talks with Dr. Kissinger in China in October 1971 and June 1972, with General Haig in January 1972 and with President Nixon's delegation in February 1972. He also accompanied the ping pong team visiting the U.S. and headed the American desk of the Chinese Foreign Ministry before he arrived in Washington in April 1973 with the advanced delegation that set up the Chinese Liaison Office.

**Hsu Shang-wei, about forty, served in the Chinese Embassy in Oslo, Norway, for over a decade. He was assigned to President Nixon's guest house in Peking in February 1972 as a protocol officer. Both Ch'ien and Hsu speak some Norwegian and referred to their service in Oslo.

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Besides answering these questions as described below, I had six subjects to discuss with them:

1. Korea

I noted that Kim Il-sung had stated in Peking that he would be obligated to invade South Korea if a rebellion broke out against Park Chung-hee and that Kim seemed to me to have recklessly stated that if the United States intervened, he would have nothing to lose but the DMZ.* Surely, I asked, China would not support such a scenario and prefers only a peaceful reunification of the two Koreas as described in Teng Hsiao-p'ings's farewell speech to Kim? Ch'ien Ta-yung leaned forward to speak quietly in English. I can assure you, he said, that foreign press reports stating that we would give Kim no aid are absolutely groundless. If the action of which you speak were to occur, it would be completely caused by the repressive measures taken by Park against the Korean people. Park would have caused it.

I insisted that I could not believe China would aid such a military adventure. Ch'ien dismissed this comment by saying that the matter was for the Korean people themselves to decide. I then asked about two recent provocations of the United States by Kim Il-sung. Would not the attack on the American officer at Panmunjom reported this morning cause a problem in Sino-American relations? Ch'ien replied that he knew of the American major's being attacked, but that this had nothing to do with China. I asked what he thought of the recent North Korean troop movements toward the DMZ. These are normal, he answered, and besides, American troops move around, too.

2. Japan

After we had consumed some slices of thousand year old eggs, shredded bean curd, sea slugs, and a whole sweet and sour fish, I asked about the

* Kim's exact words in Peking at the April 18 arrival banquet were: "If revolution takes place in South Korea, we . . . will strongly support the South Korean people. . . If the enemy ignites war recklessly, we shall resolutely answer it with war" and "we will only lose the military demarcation line and will gain the country's reunification."

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Sino-Japanese peace treaty negotiations. Wasn't it a mistake for Peking to insist on having the anti-hegemony clause in this treaty because now that the talks have stalled, Sino-Japanese relations are at an impasse and the Soviet Union will benefit from the situation? No, said Ch'ien, it was no mistake. First, we have always insisted on precisely this clause. It is part of the February 1972 Sino-American Shanghai Communique and the September 1972 Sino-Japanese agreement to normalize relations.

I said that if Peking had already established this principle, there would clearly be no need to repeat it later. Why not drop it and prevent the Soviets from gaining propaganda points? Ch'ien again leaned forward to say in English that the only common ground we have with Japan--just as with the United States--is the opposition to hegemony. Without this, what would we have for common ground, he asked? What about the Soviets, I countered? Hsu Shang-wei answered that the Soviets had not benefited, but instead had exposed themselves as hegemonists by applying so much pressure on the Japanese to prevent inclusion of the anti-hegemony clause. According to Hsu, domestic Japanese politics and Soviet pressure are the two reasons why Tokyo is still resisting the inclusion of this clause. He did not elaborate when asked about domestic Japanese politics except to refer to competing factions in the ruling LDP.

I suggested that perhaps some Japanese opposed the anti-hegemony clause because it seemed to imply the United States as well as the USSR. Ch'ien replied, how could it? We have signed the Shanghai Communique which has the same clause. It is too bad, he added, that the Japanese want to separate trade from politics when these two things are inseparable.

3. The USSR

After more courses of spring rolls, spicy soup, and deep fried prawns, I asked if there were any specific Soviet threats to Asia at present. Ch'ien replied that Vice Premier Teng's statement to President Marcos was clear enough: "One must beware letting the tiger in the back door while repelling the wolf at the front door." Ch'ien said that any specific Soviet probes would depend on where new opportunities arose and this could not easily be predicted. They are wild ambitionists, he added for good measure.

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4. President Ford's trip and Taiwan

In the midst of the camphor leaf duck, I asked how important it was that Vice Premier Teng had apparently told the group of American newspaper editors that President Ford could come to Peking without doing serious business. Is this new, I asked? Ch'ien replied that this statement was not at all new. Teng had repeated what Chairman Mao said to Edgar Snow December 17, 1970 about President Nixon. Ch'ien quoted Mao in both English and Chinese: If he comes, okay; if he doesn't, okay. If he talks, okay; if not, that's also okay. If there are results to the talks, okay; if not, that's also okay. (*T'a lai, yeh hao; t'a pu-lai, yeh hao; t'a t'an, yeh hao; t'a pu-t'an, yeh hao; t'a t'an te ch'eng-shih yeh hao; t'a t'an te pu-ch'eng-shih, yeh hao.*) We are not urging him to come, Ch'ien concluded, but he is welcome.

I expressed skepticism that Chinese cadre would understand how an American president could come to China and accomplish nothing. I described some documents from the Kunming military region that Taiwan has released which show that many comrades, especially in low levels and in the PLA, criticized Nixon's visit and the big shift in Chinese foreign policy that it implied. How can Ford's trip be justified to them, I asked. Ch'ien replied that it would be a fantasy (*huan-hsiang*) to think that the instructions of Chairman Mao can become accepted in all of China in one day. The cadres must be prepared and persuaded, he said. This was first done by Chairman Mao when he met with Edgar Snow and publicized it within China.

Hsu Shang-wei then asked if Teng's statement had reduced the pressure in the U.S. against President Ford's visit to China this fall. Hsu mentioned that Senator Goldwater had stated that Ford may go to China as long as he does not sell out old friends. I explained that conservative Republican leaders centered around former California governor Reagan would be more important than Goldwater in the President's decision because Ford would need their loyalty and funds for his campaign next year. Reagan has yet to say anything, I added, cautioning them against any overconfidence that Ford would go to Peking. Hsu then asked if the American military opposed the trip. Some may, I replied, but we have a complex military structure. I asked if Hsu and Ch'ien knew about the

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DoD Bureau of International Security Affairs (ISA) and what its counterpart would be in Peking. They were uncertain. The only counterpart they mentioned was the Foreign Affairs Department of the Chinese Defense Ministry which, Ch'ien said, only receives foreign military guests and has no policy research responsibility. Ch'ien added that it is much smaller than the ISA with which they were not familiar.

5. The Chiang Ch'ing document

During the munching of snow peas in white sauce, I asked Ch'ien if he thought Secretary Kissinger could be described as a *mao-hsien chu-yi-che* ("adventurist") or as a *shih-pai chu-yi-che* ("defeatist"). Ch'ien replied that Kissinger likes to win and was not a defeatist, but that his efforts in the Middle East suggested he had a little adventurism (defined by Ch'ien as trying to do the impossible) in his personality. Then you don't agree with Mao's wife, I asked? How is that? replied Hsu and Ch'ien. Haven't you seen her speech? I asked. That is how she has described Kissinger. Fortunately, I added, the American press has not reported this document which could be embarrassing to China. When Hsu asked why it had not been reported, I speculated that the U.S. government had perhaps frowned on it (when asked by reporters) perhaps to keep Sino-U.S. relations smooth. Hsu laughed, saying he had been told there is no press censorship here. Nevertheless, I said, someone has probably done a favor for China's image in the U.S.

I showed them a press release from Taiwan's Government Information Office in New York and the accompanying document which Taiwan claims is a speech made by Mao's wife signalling her attempt to exert authority over the Chinese foreign ministry and to involve the Central Committee's International Liaison Department (ILD) in embassy foreign affairs work by setting up two competing lines of communication between Peking and each embassy: the Party secretary of each embassy to the ILD and the Ambassador to the foreign ministry. Ch'ien and Hsu took time to read the release, then pronounced the document a forgery. They agreed with each other that there was no "Hsiang-shan hotel" in Peking--although there may be one in Taiwan, Ch'ien quipped--where the speech was

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allegedly given. Ch'ien then added that if there were two channels between each embassy and Peking, then it would be possible to detect two different policies toward the countries where China has embassies.

6. Wang Hung-wen and Chinese policy instability

Pursuing the question of 'radicalism' raised in the Taiwan press release, I asked if Wang Hung-wen and Chiang Ching were really involved in foreign affairs. If so, I asked, could Wang Hung-wen visit the United States to study conditions and to give American youth a chance to see what their Chinese counterparts are like? Ch'ien replied that both Wang and Chiang were involved in the policy level, but not daily operations of foreign affairs, especially Wang because he is a Party vice chairman. No senior officials may visit Washington as long as there is a Taiwan embassy here, he said, then paused. The U.N. would be another story, he continued in English again. I indicated puzzlement about foreign policy beliefs of the so-called Chinese radicals and mentioned that many American China "experts" worried about the fate of Chinese foreign policy after Mao.

Ch'ien explained that there was no problem of stability in China. Americans are wrong to worry about this, he said. You should study the recent interview with Etienne Manach, former French Ambassador in Peking, who replied well when he was asked about China after Mao and the succession. He said, Ch'ien continued, that Chinese always prepare the coffin before the family leader actually dies. Such preparations for succession imply nothing unusual. We now have a three-in-one alliance at the highest levels consisting of old, middle and young officials who will carry on, although this has not yet come to the foreign ministry. Ch'ien then began to attack those American social scientists who see instability in China. Even during the Cultural Revolution, he said, we criticized "empty-headed revolution" and "red-over-expert" (*k'ung-t'ou ke-ming, hung erh pu chuan*). In the current campaign to study proletarian dictatorship, it is clear that we must promote production by carrying out study and unity. Returning to Wang Hung-wen, I asked if Wang's "four bigs" were really consistent with promoting production.

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Hsu described the "four big weapons" as big debates, big character posters, big shouting, and big releasing. They replied that the "four bigs" were not invented by Wang, but by Chairman Mao. Ch'ien added that Wang might visit the U.N. if he were not too busy with domestic policy matters.

Ch'ien repeated that at present in China to grasp revolution, one must promote increased production and criticize "empty-headed revolution." I agreed. This seemed a good note on which to say farewell until next time. On the way to the door, Ch'ien told me not to worry about future shifts in Chinese foreign policy. Our new foreign policy is not merely a tactic, he said.

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