

PROF. DR. W. BÜTTIKER
P. O. Box 5770
RIYADH
SAUDI ARABIA

Riyadh, 23.1.81

Prof. R. J. Behrke,
Dept. of Fishery and Wildlife Biology,
Colorado State University,
125 Wagar Building,
Fort Collins, Colorado 80525

USA.

— how to find
you in Riyadh —
— collect species near —

Dear Prof. Behrke,

Thank you very much indeed for your kind letter which just arrived after having written another note to Fort Collins' University. I am very glad you have decided to prepare an abridged version of Dr. Al Kaban's interesting Ph. D. paper. It would be a pleasure to have it published in volume 3 or 4 of the "Fauna of Saudi Arabia". The deadline for submitting manuscripts for volume 3 is in April/May 1981, and for volume 4 about January/February 82. The title of this first part of Dr. Al Kaban's paper I find very suitable and it would be fine to have his second publication in a later volume.

As to the length and format of the "Preliminary analysis" I think some 12 to 20 printed pages would be suitable, plus line drawings and one to two colour plates of ^{biotopes} biotopes. We may decide at a later date whether we could place two or three colour photographs on one full page plate. If we may succeed in obtaining extra funds, perhaps from your department we may consider three or four full page colour plates.

I shall ask my colleague, Dr. W. Wittner, Bartsch, for quotations of the costs involved in one full page colour plate (on which 1, 2 or 3 individual colour pictures can be reproduced) we have a similar arrangement with volume 2 which is now available from the Bartsch Natural History Museum.

I would be delighted to meet Dr. Al Kahem in Saudi Arabia on the occasion of his anticipated trip to Saudi Arabia.

From the records given in Dr. Al Kahem's thesis I have noted that several of his sampling sites have been visited also by me and I have a fairly good documentation of such biotopes in wadis due to the fact that I hunted for Blackflies (Simuliidae) in the ASV and in the Hedjaz. He is quite welcome to use these colour photos if they are suitable.

Thanking you for your endeavours and with kind personal regards, also to Dr. Al Kahem,

Yours sincerely,

W. Wittner.

P.O. Box 5780
Riyadh S.A.

FAUNA OF SAUDI ARABIA

VOL. I 1979



Anthia 12-guttata Bonelli
(Coleoptera: Fam. Carabidae)

Editors:

Dr.h.c. W. Wittmer, Natural History Museum, Basle (Switzerland)
Prof. Dr. W. Büttiker, Ciba-Geigy (Saudi Arabia) Ltd., Riyadh (Saudi Arabia)

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Fig. 9. Ad Diriyah, the ancient town, near Riyadh. Situated in the Wadi Hanifa there are irrigated date palm plantations, fruit orchards and vegetable gardens. Sampling site 2.



Fig. 10. Sand dunes near Chureis in the Dahna Desert, 115 km ENE of Riyadh. Very sparse vegetation (*Calligonium*, *Fagonia*), but typical habitat of *Ammogiton sonyae* Kaszab (Coleopt., Tenebrionidae). Sampling site 6.

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Prof. Dr. W. Büttiker, Riyadh

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Fig. 11. View from top of Jebel Tuwaiq escarpment at Wadi Khumra in western direction to Wadi Durma. Sampling site 12.



Fig. 12. Growth of shrubs and graminæ in Wadi Tumeir after abundant winter rainfall. Sampling site 13.

Date of issue August 15, 1980

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Prof. R. Behrke,
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Dear Prof. Behrke,

Thank you very much for your letter of July 2nd, 81 and your explanation regarding your manuscript and the news about new material of fresh water fishes of Saudi Arabia.

I had a phone call from Mr. Alkhalaf yesterday telling me that he collected new specimens during his actual expedition in Saudi Arabia. It is a pity I did not meet him personally, but I was able to inform him that the dead line for the submission of the new version of the manuscript will be the beginning of April 1982, for volume 4 of the "Fauna", due to be published by end of 1982.

Looking very much forward to hearing from you and with kind personal regards,

Yours sincerely,

W. Buttiker.

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افريبيلا USA.

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COLLEGE OF SCIENCE



كلية العلوم

Date : : التاريخ No. : : الرقم

Dear Dr. Benitez

I haven't received any letter from
in a long time. I hope everything
is all well. I know you are very busy
with your students and projects. What is happening
to colourful Colorado. Is it showing
this year. Enclosed is a paper ~~on~~
osteological studies. Could you please
read and your comments is highly
appreciated. Best wishes to you

Hamoud



Trewzss : Tilypine Fisks.

late Pliocene/early Pleistocene

best long humid period at

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Hötzl, H. and J.G. Zötl, 1978. Climatic changes during
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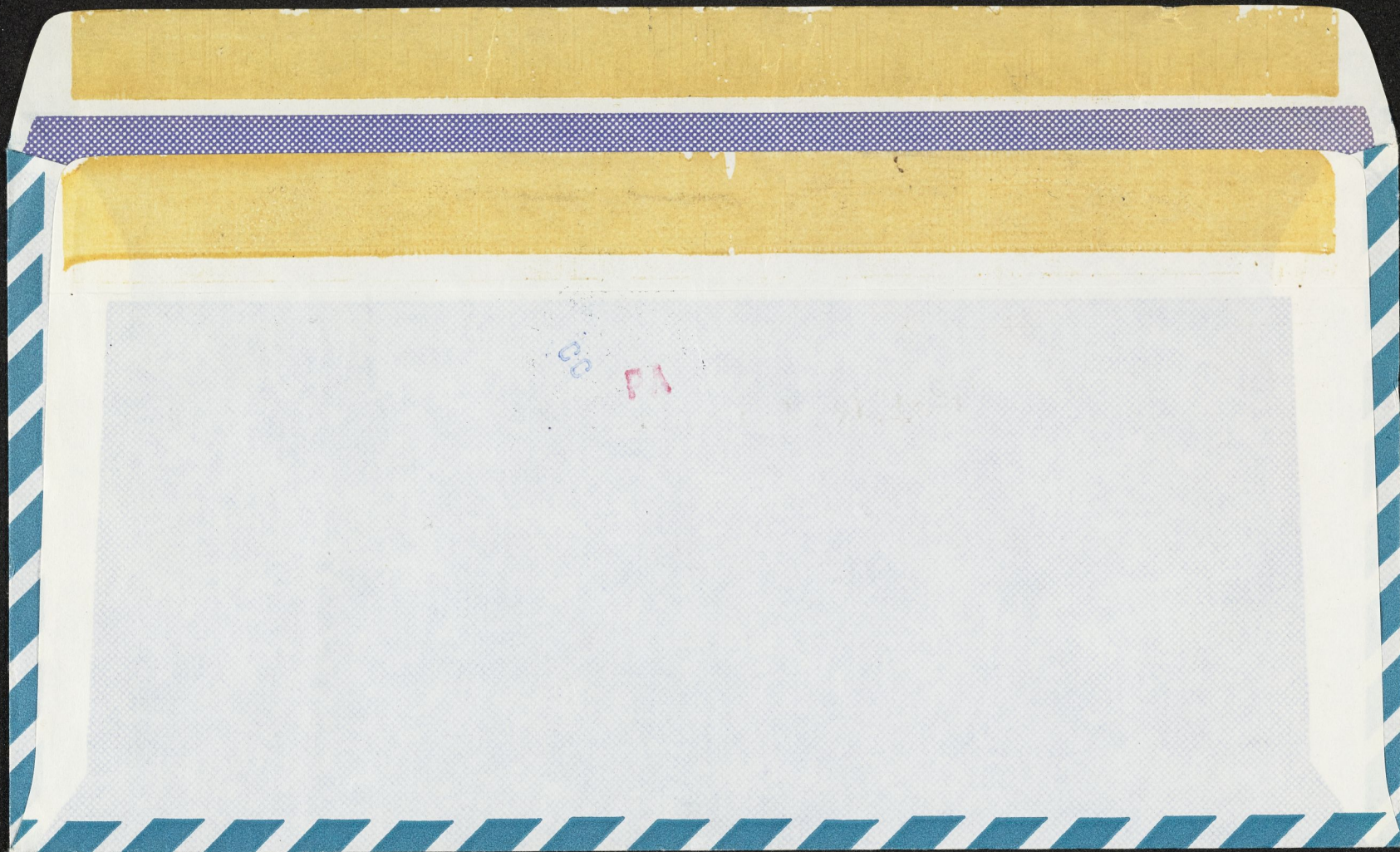


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Food Selection by The Arabian fish;
Cypririon acinaces.

H.F.AL-KAHEM. A.R.S. AL.AKEL AND M.J.K. SHAMSI

Department of Zoology College of
Science, P.O.Box 2455, King Saud
University, Riyadh. 11451. Kingdom
of Saudi Arabia.

Abstract

Food preference by the Arabian fish; Cyprinion acinaces was studied. The fish was found to be a selective feeder. A positive selection was observed for most of the phytoplanktonic organisms and algal spores and ~~of~~ Zgotes, while other genera either negatively selected or completely avoided. Some degree of 'stenophagisme' with respect to some phytoplanktonic communities is evident. factors that influence the selective behaviour of species are discussed.

Introduction:

"Feeding is one of the most important function of an organism-its growth, development, and reproduction- all takes place at the expense of the energy gained from it's food" (Nikolsky, 1963). The problems related to the

feeding of fishes have undoubtedly of a great significance in fish husbandry. Pond cultivation of economically important fishes is inconceivable without knowledge of the basic nature of their food and feeding habits. In recent years, considerable attention has been given to the problem of selective feeding of species in their natural environment, due to the fact, that it regulate the fish management and cultivation. Studies on the selection of food resources by fishes have been carried out on a small scale, ^{few} ~~few~~ topics on food selection have been discussed by Griffith, 1974; Strauss, 1979; Aravindan, 1980; Gardner, 1981, Hansen and Wahl, 1981; Matheas and Ale, 1982; Strauss, 1982; Colton and Alivizan, 1983; and Viljanen, 1983). It is evident that this area, concerning these aspects is out of touch, so an attempt has been made to elucidate some aspects on food selection by the freshwater fish: Cyprinior acinaces from Khaybar drainages, Saudi Arabia, since such information gives an idea of the nutritional spectra of fishes, which may be important for the management of their populations. This may be beneficial for establishing the inter-specific feeding relationships among different economically important fishes.

Methods

Specimens of cyprinior acinaces were collected using gill net from Ain Salaleem, Khaybar (25 42 N 39 31 E)

Saudi Arabia. The specimens varies from 140-175 mm in length and 35.0-60.0 gm In weight. Sampling was done in early hours of the day, since during this period, the gut were found to contain items in fresh and identifiable condition. The guts were removed and preserved in 10% formaldehyde solution. The content was then washed ~~out~~^{cut} into a petridish with a known volume of water and mixed thoroughlye. The various planktonic genera were identified using the keys of ward and whipple (1963) and Needham (1964). Number ^{of} method' (Jafri and Mustafa, 1977) was applied for the anaysis of gut contents. The relative abundance of various Food organisms was expressed as percentage. The relative percentage of various planktonic organisms present in the environment were likewise identified in water sample from the some area. The selectivity was calculated according to the following equation:

$$E = \frac{r_i - p_i}{r_i + p_i}$$

where,

E =the electivity index,

r_i=the percentage of food organism in the gut, and

p_i=the percetage of that food organism present in the environment.

Values of the electivity index could range from (-1) when the food items was completely ignored by the fish, to (+1) when the food intems was highly selected.

Results

Various planktonic food organisms in the gut (ri) and its percentage in the environment (pi) together with its electivity index (E) are given in Table. I.

It was observed from the data, that the species was definitely selective in its feeding. Among the blue-green algae, a positive selection was observed for Anabaena and Nostoc, while polyeystis, tetrapedia and Merosompedia was negatively selected, as its percentage was smaller in the gut than in the environment. Oscillatoria and phormedium were completely avoided by the fish. For green algae, the fish seemed to select positively, protococcus, Ulothrex, spirogyra, Selenastrum and Ankistrodesmus and the remaining genera (~~Table I~~) were negatively selected. ^(Table I) Gonatozygo and Closterium among the desmids appeared positively in the gut but Staurastrum seemed to be negatively selected by the fish. Among the diatoms, the fish exhibited a positive selection for Nitzschea, Nevicula, Diatoma and Synedra, although, Fragilaria, Cyclotella and Tabelloria were the genera which appeared negatively selected. A complete avoidance of cocconeis was observed. For the phytoflagellates, however, Volvox was selected against the Chlamydomonas.

The percentages of rotifers were low in the gut than in the environment and consequently, the values of electivity index were found to be negative (Table. 1)

Algal spores and zygotes seemed positively taken by the fish. In most of the fishes the mosquito larvae in semi-digested form were found in the gut of this species.

Discussion

The data of electivity index revealed the ~~selective~~^{selective} feeding behaviour of this species. The complete avoidance of some food organisms by the fish may either be due to their being unaccessible to the fish by virtue of their behaviour, or to their rejection as food because of distastefulness. Indeed, it has been well established that after completing the ontogenetic development, the fishes orientate towards their food by means of their taste organs (Nikolsky, 1963). Avoidance of some food items (Table-1) probably indicates that either these organs are not specialized enough to seek out those food, or due to their unaccessibility and distastefulness. Selective feeding can be expected from fishes when the energy gained by feeding (as preferred food items) exceeds the energy that has been lost during selection. This may correlate with the work of Hinde, 1959; Mustafa 1976; Naukousky, 1979, and Bartell, 1982, where they mentioned that fishes expend more energy in selecting prey of larger size in order to gain more energy. The prominence of phytoplanktonic food in the gut of this species and avoidance of a number of zooplanktonic genera, indicates that selectivity is not based on the size of the prey. It can also be concluded that the fish look for food of

maximum digestibility, so as to get more assimilation of it in the body, and any attempt related the selection efforts to the size of the food can easily be rejected on the contention that the prey of larger size may equally be more indigestible than smaller prey. The phenomenon of food ~~selectivity~~^{selectivity} has been interpreted by Cantin et al (1974) as an inherent instinctive property of the fish. The avoidance of some food organisms by the fish, shows a degree of "stenophagisme". Although this habit can ensure less expenditure of energy in searching, seizing and assimilating the food organisms. As much as a stenophagic fish is adapted to conserve only a smaller food items and is incapable of utilizing the others that may be present in abundance and easily accessible. This condition may be an adaptation of the fish to make use of the available food at a time when the preferred food organisms do not occur in the environment as a consequence of their succession. In the present investigation, the presence of mosquito larvae in the gut which may perhaps occasionally appears in the food may change the food selection. If the fish become habitual of taking the mosquito larvae as a food, it can be said that C. acinaces may be used for biological control.

It also be concluded that feeding opportunities, availability and abundance of food and the mobility of the prey influenced the selection of food by the fish from its natural environment. Such type of conclusion

has also been reported by Jafri and Mustafa 1977;
Wankowsky, 1979; Bartell 1982; michalety et al.
1982 and colton and Alevizan, 1983.

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TABLE 1. Percentage of planktonic food organisms in the gut (ri) and environment (pi), and electivity index (E) of Cyprinion acinaces.

Food Drganism	Pi	ri	E	Food Organism	Pi	ri	E
<u>BLUE-GREEN ALGAE</u>				<u>PHYTO-FLAGILLATES</u>			
Anabaena	0.73	1.38	+0.31	Volvox	1.22	1.84	+0.20
Nostoc	0.49	4.83	+0.82	Chlamydomonas	0.97	0.34	-0.54
Polycystis	2.43	0.23	-0.83	<u>ROTIFERS</u>			
Tetrapedia	4.38	0.92	-0.65	Asplanchna	2.19	0.46	-0.65
Merismopedia	5.59	2.53	-0.38	Keratella	1.46	0.92	-0.23
Oscillatoria	2.92	-	-1.00	Filina	1.70	1.38	-0.10
Phormidium	1.46	-	1.00	<u>SPORES & ZYGOTES</u>			
<u>GREEN ALGAE,</u>				Spores & ZYGOTES	7.78	10.92	+0.17
Pretococcus	4.14	4.83	+0.08				
Ulothrix	4.38	6.89	+0.22				
Spirogyra	3.16	5.52	+0.27				
Selenastrum	1.46	3.10	+0.36				
Ankistrodesmus	2.92	4.37	+0.19				
Botryococcus	5.59	1.95	-0.48				
Ophiocytium	4.14	1.38	-0.50				
Characium	4.14	2.53	-0.24				
Crucigenia	6.33	2.53	-0.43				
<u>DESMIDS.</u>							
Closterium	3.41	9.19	+0.46				
Gonatozygon	1.70	2.53	+0.19				
Staurastrum	3.16	1.15	-0.47				
<u>DIATOMS</u>							
Netzschia	0.97	4.59	+0.65				
Navicula	2.43	8.62	+0.56				
Diatoma	2.92	8.04	+0.47				
Synedra	3.16	5.75	+0.29				
Cyclotella	3.65	0.23	-0.88				
Fragilaria	1.75	0.23	-0.79				
Tabellaria	2.68	0.80	-0.54				
Cocconeis	4.38	-	-1.00				

No:

Date: 28 Jan, 1984 التاريخ:

Dear, Dr. Behrke

many thanks to you for your letters.

I have received all of them. I am very sorry for the delay. I promise you that I will not do it again! I gave you a lecture regarding our concept of conservation. There is a sign of hope.

I don't know who is sending fish to you. No body promised him from our dept; probably some body else. I haven't heard my word on the publication of vol. 5. Do you? I haven't heard my word from Randy Gaerzer and also Dr. Karan V. Rajan. Hopefully Dr.

Redston will say something
about our concept of conservation?
I have been told that some body
stocked Cambusia in Al Hufuf's
Springs (Eastern region).

Finally I missed Colorado's winter!!

my Best wishes to you and your
family.

Sincerely

Amoud

Husoud AlKahem
Zoology dept.,
College of Science,
King Saud University,
Riyadh, Saudi Arabia.

To; Dr

Departu

Biology.

Colorado Sta.

St-collins, Colorado,

USA

الولايات المتحدة



BY AIR MAIL

PAR AVION

Dean Kirk Sand Uno
last week - ^{CS}OH 7th Mt

YKA

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

المملكة العربية السعودية
وزارة التعليم العالي



COLLEGE OF SCIENCE

كلية العلوم

Kingdom of Saudi Arabia
Ministry of Higher Education

King Saud University

Thanks for CSU's

Bulletin - Any

news from

Krupp, Coull

& Banister?

Date: 24 Aug - 1485 التاريخ No. : الرقم

Dear: Dr. Behnke

I don't know how to start, but I am very
sorry for not responding ~~at~~ on time. As
you might expected, I very busy. ~~and~~ I teach
General Zoology, General biology, Ichthyology,
evolution etc. Frankly I don't have much
time to work w/ IWF of Arabia. However,
I visited areas such Abha (two trips), Khyabar (one
trip), Jizran (one trip) and AlHafuf (2 trips).
It is bad news for fish?, most of their habitats
are in a bad shape. many exotic fishes have been
introduced into AlHafuf (eastern region) springs,
such as Oreochromis niloticus, C. aurea,
Mugil sp., Labeo sp. and more is expected.

I ~~felt~~ ^{felt} it is my responsibility to explain the
nature of ^{the} problems ~~and what we can get from~~

Then species. So, I went to a meeting held
last month at Abha - Several topics regarding
conservation have been discussed. It was
promising and hopefully will carry the jobs.
I gave a talk at the meeting and explained to
the audience the nature of the problems & ~~the extent of~~ ^{values of}
conservations and several reasons to face the
problems. Most people appreciated the talk.
The result of the meeting will be published
in a special proceeding ^{vol.}. Most of my ideas
come from our joint work (from my Ph.D
thesis). I recommended Aphanis dispar as
a biological control agent in controlling
mosquito larvae ~~for~~ ^{to} the ministry of health.

How is your family specially Robert at school.
my regards and ^{best} wishes to them all. my son still

remember few words of english. Hopefully

~~the~~ you are enjoying St. Collins' spring season.

Best wishes to you

H. H. H.
Hrouel

P.S. I met Butkire at the meeting. He is an old man
and he is working for M&PA. He is continuing his series on
the Arabian Journal (Reviewing - 7th vol.)

٧٢٢

قسم علم الحيوان
Zoology Dept.

Kingdom of Saudi Arabia



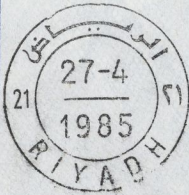
COLLEGE OF SCIENCE
Riyadh, 11451 P.O. Box 2455



Dr. R. Behnke
Fishery and wildlife department
Colorado state University,
Ft-Collins, Co. 80523,
U.S.A.

17724
سورت نبي

قسم علم الحيوان
جامعة ولاية كولورادو
كولورادو 80523



لجنة الامريكه
الدراسه ١



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

المملكة العربية السعودية

وزارة التعليم العالي



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Kingdom of Saudi Arabia

Ministry of Higher Education

King Saud University

Date: Dec. 16/1983 No. : الرقم

Dear Dr. Behnke

I have sent a copy of our paper on expression selection for editing and correction, but ~~we~~ haven't received it yet. Have you received it? If so could you please edit it and kindly return it to me.

Happy Christmas and a happy new year to you and to your family.

Sincerely
H. Al-Khatib

قسم الحيوان
Zoology Dept



✓

Kingdom of Saudi Arabia



COLLEGE OF SCIENCE

Riyadh, 11451 P.O.Box 2455



17354

To: Dr. R. Behnke
Fishery & wildlife Dept;
Colorado state university
Ft-collins, Co. 80523
U.S. A. Adress
ربريت بيكر
قسم اسماك
كلورادو
ماتسورايف
صورت كونيتر
الولايات المتحدة

Atalla Mukheysin Ali
1985. Morphometric characters of
the Khinni, Barbus lotreus, from
Tartar Res. - Tigra R. - V.I. 25 (57)

— 1979 - Morphometrics of
B. Xanthopterus in Jour. Gulf & Arabia
11(1): 3-11. — In Arabic.

