External qì effects on the *Pseudodiploria* genus corals that have been affected by the white syndrome, in the Puerto Morelos Reef National Park, Quintana Roo, Mexico.

Citlalli Álvarez[1], María del Carmen García-Rivas[2], Benjamín Muñoz[3], Iván Velázquez[4] and Andrea Dovarganes[5].

[1]The Best of Me - Zhìnéng Gìgōng Training and Scientific Research Institution. Mexico City. Email: yesca1967@yahoo.com

[2] Puerto Morelos Reef National Park (PNAPM) Quintana Roo, Mexico. Email: mcgr@hotmail.com

[3]Crane's flight, Mexico City. Email: benjamuga@gmail.com

[4]Environmental Education Center, Mexico City. Email: ivansujail@yahoo.com

[5]Health Coach, Mexico City. Email: andreatohen@gmail.com

***Abstract* - The qì emission effects on Pseudodiploria genus corals affected by the white syndrome in the Puerto Morelos Reef National Park, Quintana Roo, Mexico, attempted to be studied. 18 coral colonies were part of the control and experimental groups. The 9 colonies of the experimental group received the non-invasive treatment of external qì (with free diving and scuba diving) for 5 minutes, summing up 15 non-consecutive days of treatment. Unfortunately, it was not possible to measure the diseased area in coral colonies neither perform the statistical analysis, therefore we were not able to conclude if receiving external qì affected the diseased area. A visual analysis of the colonies is presented hoping that the experience obtained in the present study can be used in future projects.**

***Keywords* – Corals, external qì, *Pseudodiploria,* white syndrome, zhìnéng qìgōng.**

I. Introduction

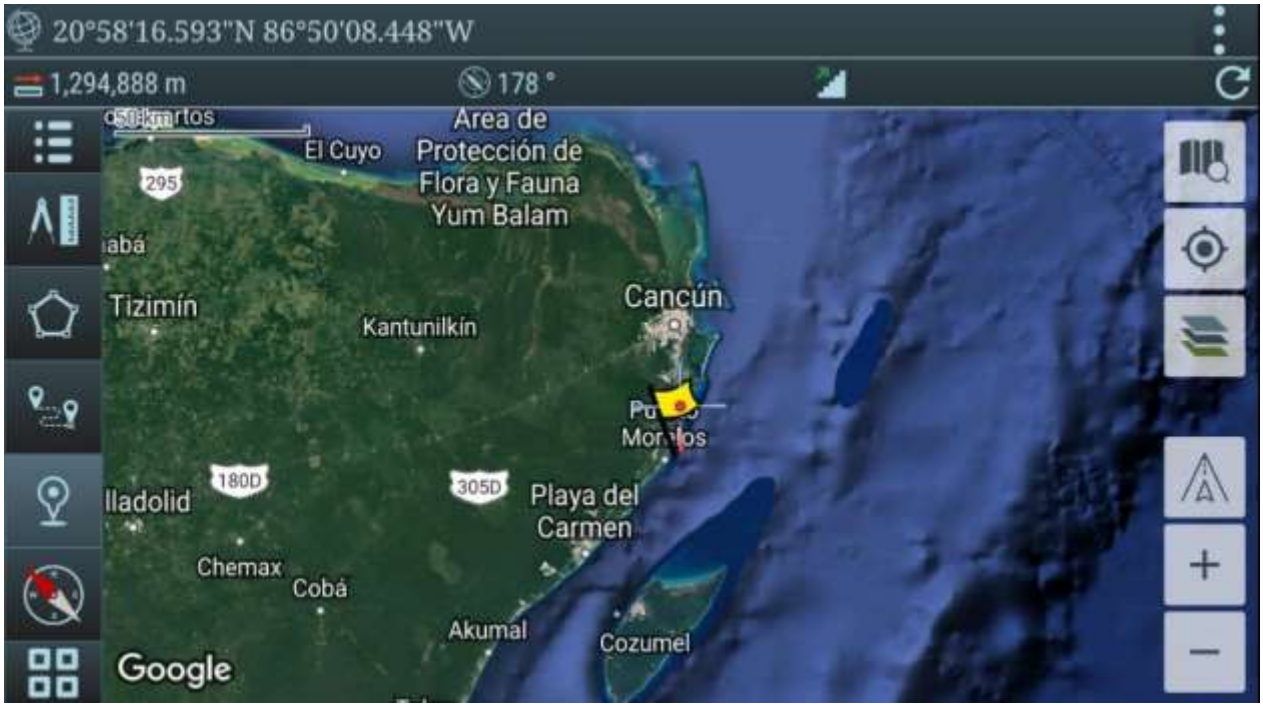
The qì word is a Chinese term that refers to the force that makes up and binds together all things in the universe; since ancient times the great Chinese masters have worked with the qì to cure diseases, stay healthy and prolong life expectancy [1], [2].

The Zhìnéng qìgōng is a Chinese philosophy that combined ancient knowledge with modern science in order to work with qì and promote physical, mental and emotional health of practitioners [1] - [3].

There are two main forms of practice: internal and external. In internal practice practitioners perform physical and mental exercises to improve their health. In the external practice practitioners project qì to other people to improve their health. This external practice is not only applied on humans, but also in animals, plants, cells, organisms in culture media and in different inorganic materials [4] - [8]. The external practice is a non-invasive technique in which there is no physical contact between the sender and the receiver. Although this type of research is becoming more popular, we did not find any work previously done with corals; however, there may be studies done in Asian cultures that have not been yet translated into English.

A. The Puerto Morelos Reef National Park (PNAPM) is in Mexico, in the Yucatan Peninsula, north of the state of Quintana Roo and it has a total area of 9,067 hectares (Map 1).

The PNAPM is part of the Mesoamerican Barrier Reef System and has a high marine biodiversity which is well preserved and has a high ecological, economic, recreational, historical, commercial, educational, landscape and research value, which is why it is great importance at national level. In addition to this, the reef is the most important economic source of the community of Puerto Morelos due to fishing, the tourism sector and scientific research, hence the importance of its conservation and the proper use of its natural resources [9].



Map 1. Puerto Morelos Reef National Park (PNAPM), Quintana Roo, Mexico.

B. White syndrome in corals (White Diseases and Syndromes, WDS).

In May 2018, one of the authors (MCGR) detected anomalies in stony corals colonies which had white areas with loss of tissue that increased rapidly in a few weeks until the whole colony died. These white areas appeared in coral colonies commonly called "brain corals", "column corals" and "massive corals" among others (families Montastraeidae, Meandrinidae and Merulinidae) (Figs. 1 and 2).

In communication with groups of experts from the region (Biodiversity and Reef Conservation Lab unit Institute of Marine Sciences and Limnology of the National Autonomous University of Mexico, Healthy Reef Institute, and the Regional Center for Aquaculture and Fisheries of the National Fisheries Institute), it was identified as possibly the syndrome described by [10] as "Stony Coral Tissue Loss Disease" affectation that began in the Florida reef in 2014 similar to the white plague, this disease manifests as a white ring or several white patches of rapidly expanding necrotic tissue, and in most cases the disease radiates outward killing the coral leaving the skeleton naked so it is quickly colonized by sediment or algal mats.

In the Mexican Caribbean Sea, it has been called "white syndrome" and by September 2018 damaged colonies had already been reported throughout the Quintana Roo Coast for the species: *Meandrina meandrites, Dendrogyra cylindrus, Diploria strigosa*, *Dichocoenia stokesii, Eusmilia fastigata, Siderastrea siderea, S. radians, Colpophyllia natans, Orbicella faveolata, Diploria labyrinthiformis, Pseudodiploria strigosa* y *Montastraea cavernosa* [11].

Figure 1. Coral colony of the Montastraeidae family with white syndrome.

Figure 2. Massive coral colony with white syndrome.

Until now the affected colonies have been treated with chlorine and antibiotics in Florida without favorable results [12], and the affectation continues causing a great mortality. In Mexico, some colonies have already been treated with these methods; particularly in the PNAPM in February 2019, treatment with antibiotics was started in brain colonies without success [13] but treatments are still being tested.

In order to know the effects of the external qì in corals affected by the white syndrome in the *Pseudodilporia* genus 26 colonies were chosen in the Puerto Morelos Reef National Park (Fig. 3).

Figure 3. Coral colony of the genus *Pseudodiploria* with white syndrome.

II. METODOLOGY

Different areas of the PNAPM were explored to locate diseased coral colonies of the genus *Pseudodiploria.* The area known as "radio pirata" was chosen because it had a larger number of sick colonies and was close to the fishing pier. The selected zone is within the first 20 meters of the braking waves line within the reef lagoon, there were marked with 13 buoys a total of 26 diseased colonies (Table 1).

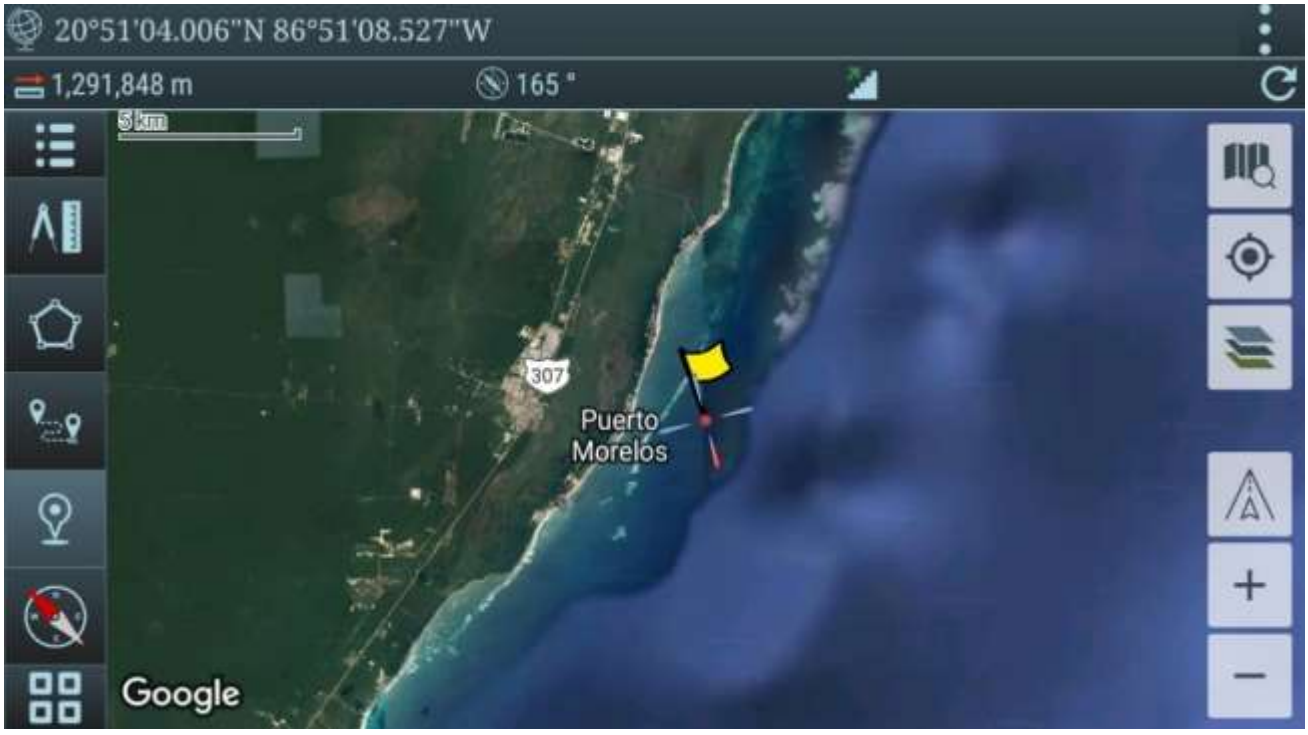
Table 1. Buoy number and coral colonies diseased by buoy.

Buoy	1	2	3	4	5	6	7	8	9	10	11	12	13
Number of sick colonies	1	1	5	3	3	2	3	3	1	1	1	1	1

Using a global positioning system (GPS), the 13 buoys were recorded to make the marine maps of the site (Maps 2 and 3).

Subsequently, the photographic record of the coral colonies was made to have the initial health status.

The 26 diseased coral colonies were randomly divided into control group and experimental group.



Map 2. "radio pirata" study area in Puerto Morelos, Quintana Roo, Mexico.

Map 3. Location of the 13 buoys with diseased coral colonies.

The colonies of the experimental group received the treatment of external qì, by free diving and SCUBA diving, for 5 minutes, for 3 weeks until completing 15 days of treatment (Figs. 4 and 5).

Figure 4. Sick coral colony receiving the external qì treatment by SCUBA diving.

Figure 5. Sick coral colony receiving the external qì treatment by free diving.

Three weeks after having carried out the first treatment, a second photographic record of the coral colonies was obtained to see the final health status and compare the photographic records.

Three months after beginning the treatment, an attempt was made to take a third photographic record to see if the colonies had already died or they were still alive.

III. DATA ANALYSIS AND DISCUSSION

The present project could not be analyzed statistically due to the following reasons:

1. The experimental design had complications. The photographic record was planned in such a way that the images were taken from the same place, at the same distance, and at the same angle in order to make the comparison between initial and final registration; however, this was not possible because on the day the first photographs were taken there was bad weather, which hindered the placement of the quadrant in each colony. Due to the swell, several buoys broke off and only 6 of the 26 colonies could be located and photographed.

2. Four days after the photographic registration and even in bad weather, the external qì treatment was initiated in only 4 colonies.

3. Subsequently, 21 more colonies could be located, of which 5 were integrated into the experimental group and they began to receive external qì treatment.

4. Due to the above, there was no homogeneity in the treatment. Four colonies received the qì treatment for 15 days, 3 colonies received the treatment for 11 days, and 2 colonies received the treatment for 10 days. The decision to integrate more colonies into the experimental group even though treatment had already begun was due to seeing the fast growth of the disease in the colonies and to try to save them.

5. Forty-five days of treatment were scheduled, however, the lack of boat, the bad weather, and the limited budget, reduced considerably the time of the project. In 3 weeks only 15 days of treatment were achieved for the 4 initial colonies.

6. Coincidentally, in the second photographic record, there was also bad weather and photographs of all the colonies were not obtained.

7. The third photographic record (at 3 months) never was completed.

8. The attempt to compare the start-end colonies health status could only be carried out in 18 of the 26 colonies (9 experimental colonies and 9 control colonies), and only in a visual way without any mechanism to measure sick or healthy area of the colony.

EXPERIMENTAL GROUP COLONIES

Colonies that received 15 days of treatment

Buoy # 12

Initial photo: October 31, 2018

Final photo: November 28, 2018

Photo at 3 months: February 2019

Analysis: In this colony the disease progressed little during the treatment period and 3 months later, most of the colony is still healthy.

Buoy #8 colony 1

Initial photo: October 31, 2018

Final photo: November 28, 2018

Analysis: In this colony the disease progressed little during the treatment period, however, there is no registration at 3 months.

Buoy # 5 colony 1

Initial photo: November 9, 2018

Final photo: November 28, 2018

Analysis: For this colony there is not initial photo at October 30 and the final photo was taken from a completely different angle. There is no registration at 3 months

Buoy #6 colony 1

Initial photo: October 31, 2018

Final photo: November 28, 2018

From different angle

Photo at 3 months: February 2019

Photo at 4 months: March 2019

Analysis: In this colony, progress of the disease is observed during the treatment period. The photo at 3 months has a completely different angle, but you can see portions of the colony still alive. By the fourth month almost the entire colony has died.

Colonies that received 11 days of treatment

Buoy #8 colony 2

Initial photo: October 31, 2018

Final photo: November 28, 2018

Photo at 4 months: March 2019

Analysis: In this colony the disease advanced a little more during the treatment period, however, at 4 months it is still alive.

Buoy #8 colony 3

Initial photo: November 9, 2018

Final photo: November 28, 2018

Analysis: For this colony there is not initial photo of October 30 and it is observed that the disease advanced a little more in the treatment period. There is no registration at 3 months.

Colonies that received 10 days of treatment

Buoy #6 colony 2

Initial photo: November 18, 2018

Final photo: November 28, 2018

Photo at 3 months: February 2019

Photo at 4 months: March 2019

Analysis: In this colony progress of the disease is observed during the treatment period, however, the photos at 3 and 4 months show that most of the colony is still alive.

Buoy #5 colony 2

Initial photo: November 9, 2018

Final photo: November 28, 2018

Analysis: For this colony there is not initial photo of October 30 and it is observed that the disease advanced a little more in the treatment period. There is no registration at 3 months.

Buoy #5 colony 3

Initial photo: November 9, 2018

Final photo: November 28, 2018

Analysis: For this colony there is not initial photo of October 30 and it is observed that the disease advanced a little more in the treatment period. There is no registration at 3 months.

CONTROL GROUP COLONIES

Buoy #13

Initial photo: November 9, 2018

Final photo: November 28, 2018

different angle

Photo: November 18, 2018

Photo: November 28, 2018

Analysis: In this colony there are 2 affected areas, but there are not initial photos of October 30. It is observed that the disease was advancing. There is no registration at 3 months.

Buoy #7 colony1

Initial photo: October 31, 2018

Final photo: November 28, 2018

Analysis: In this colony the photos were taken at different angles, however, it is observed that the disease advanced. There is no registration at 3 months.

Buoy #7 colony 2

Initial photo: November 9, 2018

Final photo: November 28, 2018

Analysis: For this colony there is no initial photo of October 30. It is observed that the disease advanced rapidly. There is no registration at 3 months.

Buoy #7 colony 3

Initial photo: November 9, 2018

Final photo: November 28, 2018

Analysis: For this colony there is not initial photo of October 30; photos were taken at different angles and due to the presence of the soft coral the sick area can't be appreciated very well, however, a slight increase can be appreciated. There is no registration at 3 months.

Buoy #4 colony 1

Initial photo: November 9, 2018

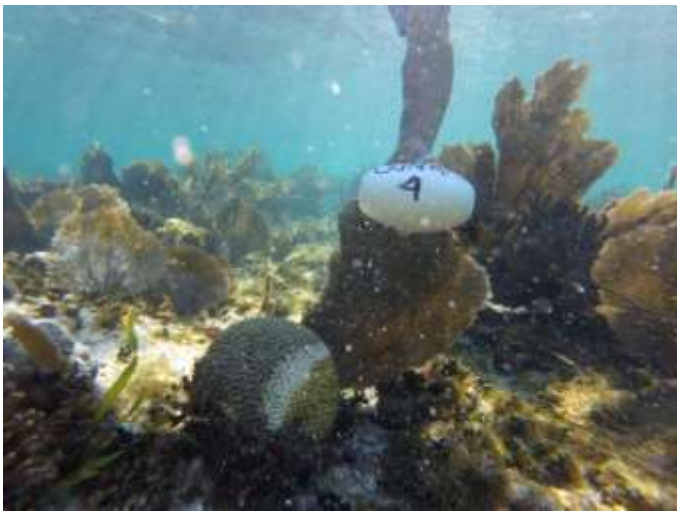
Photo: November 19, 2018

Final photo: November 28, 2018

Photos at 4 months: March 2019

Analysis: For this colony there is not initial photo of October 30; photos were taken at different angles. About November 19 photo a little advance in the disease is observed. However, in the photos at 4 months the disease has advanced rapidly observing only a small portion of the colony still alive.

Buoy #4 colony 2



Initial photo: November 9, 2018

Photo: November 19, 2018

Final photo: November 28, 2018

Analysis: For this colony there is not initial photo of October 30. Although the photos were taken at different angles, a rapid increase in the disease can be seen. There is no registration at 3 months.

Buoy #4 colony 3

Initial photo: November 9, 2018

Photo: November 19, 2018

Final photo: November 28, 2018

Analysis: There is not initial photo of October 30 for this colony. The 3 photos have different angles, and it is not possible to compare anything. There is no registration at 3 months.

Buoy #3 colony 1

Initial photo: October 31, 2018

Final photo: November 28, 2018

Analysis: The photos were taken at different angles and although they are not comparable, an increase in the dead tissue can be seen. There is no registration at 3 months.

Buoy #3 colony 2

Initial photo: November 9, 2018

Final photo: November 28, 2018

Analysis: There is not initial photo of October 30 for this colony. The photos are in different angles, but an increase in dead tissue can be observed. There is no registration at 3 months.

IV. CONCLUSIONS

In both, experimental and control group photos records, it is noted that the disease was advancing, unfortunately in this project it was not possible to measure the diseased area or make the statistical analysis so it can't be concluded that if in the colonies that received the external qì treatment the disease advanced differently in relation to the colonies that did not receive qì.

It is suggested to carry out more trials involving the community to generate empowerment and interest in the problem. To look for sponsorships for obtaining greater economic and human resources. To perform a greater number of treatments for a longer period considering environmental factors predominantly.

The experience gained in this project remains as background hoping that it will be used in future projects.

V. ACKNOWLEDGMENTS

Citlalli Álvarez deeply appreciates:

- the valuable altruistic participation of all the participants,
- teacher Páng Hè Míng creator of the Zhìnéng qìgōng, and
- my teachers De Ming Qiu and Zhang Qing for their unconditional support.

The project was carried out without specific financing, Citlalli Álvarez and Benjamín Muñoz financed the transportation, lodging and treatment expenses, Armando Gasse made the photographic record, Iván Velázquez prepared the maps, the CONANP and Alltournative provided boats and support staff, Sian Ka'an Friends provided fuel for the CONANP vessel, money for tank loads, diving equipment and personnel, AIRE provided discount on tank loads and Andrea Dovarganes corrected the English translation of the manuscript.

VI. REFERENCES

[1] De MQ, 2016. The Treasure of Good Health and a Happy Long Life. ZhiNeng QiGong Science. Mexico, City: Crane flight, pp. 3–68.

[2] Ooi KH, 2010. ZhiNeng QiGong: The science, theory and practice. San Bernardino CA: Island ZhiNeng QiGong Center, pp. 16–72.

[3] The Best of Me, ZhiNeng QiGong, 2017. Benefits. http://www.thebestofmeusa.com

[4] Sancier KM and B Hu, 1991. Medical applications of Qigong and emitted Qi on humans, animals, cell cultures, and plants: Review of selected scientific research. American Journal of Acupuncture. 19 (4), 367-377. https://www.qigonginstitute.org/docs/Qi_on_humans_animals&cells.pdf

[5] Contributors NMJ, 2010. An Evidence-based Review of Qi Gong by the Natural Standard Research Collaboration. Natural Medicine Journal. 2(5). https://www.naturalmedicinejournal.com/journal/2010-05/evidence-based-review-qi-gong-natural-standard-research-collaboration

[6] Álvarez C and S Becerril, 2018. The Effects of ZhiNeng QiGong practice on Glucose Levels, Blood Pressure, and Body Weight in People with Acquired Visual Disability. Qi: The Journal of Traditional Eastern Health & Fitness, 28 (3), 4-7.

[7] Álvarez C, P Hernández, D Cruz and V Chávez, 2017. The Effects of External Qi on Growth of Shoots of Dahlia brevis in Vitro. International Journal of Research in Agricultural Sciences (IJRAS) 4 (6), 354-357. http://ijras.org/administrator/components/com_jresearch/files/publications/IJRAS_640_FINAL.pdf

[8] Álvarez C, M Salmerón, I Velázquez, H Islas, C Moore and H Trejo, 2018. Preliminary study of the effects of external Qi in the body weight of two black iguanas *Ctenosaura pectinata.* http://www.ijvets.com/volume-7-no-4-2018/

[9] National Institute of Ecology, 2000. Management Program of the Puerto Morelos Reef National Park of Mexico. 1st edition. https://web.archive.org/web/20070622081629/http://conanp.gob.mx/anp/programas_manejo/puerto_morelos.pdf

[10] Lunz K, J Landsberg, Y Kiryu and V Brinkhuis, 2017. Investigation of the Coral Disease Outbreak Affecting *Scleractinian* Coral Species along the Florida Reef Tract. Florida Department of Environmental Protection Available at: https://floridadep.gov/sites/default/files/FWRI-Diseases-Report.pdf.

[11] García-Rivas MC, 2018. Informative note of records of sick corals in ANP of the Mexican Caribbean. Yucatan Peninsula and Mexican Caribbean Region. Quintana Roo, Mexico.

[12] Neely K, Private communication, November 2018. Nova Southeastern University Florida, USA.

[13] García-Rivas MC, Private communication, July 2019. Puerto Morelos Reef National Park, Quintana Roo, Mexico.