

## 江原道 海域 海藻類의 分布

夫 性 民

(忠南大學校 自然科學大學 生物學科)

### Distribution of Marine Algae from Shore Area of Kangwon Province

Boo, Sung-Min

Department of Biology, Chungnam National University, Daejeon

Marine flora by reference studies and vertical distribution patterns of the algae are investigated at the shore area of Kangwon Province. A total of 231 taxa, 9 blue-green, 145 red, 55 brown, and 22 green algae are reported to grow in this area. The positive characteristic species of the flora are *Coccolithus langsdorfii*, *Costaria costata*, *Kjellmaniella crassifolia*, *Tichocarpus crinitus* and *Odonthalia corymbifera*, whereas the negative characteristic species are *Ishige okamurae*, *I. sinicola* and *Pelvetia siliquosa*. The intertidal zone of this shore is divided into two subzones, the upper and mid-lower ones.

Key Words : Flora, Vertical distribution

강원해역은 북위 37°17'~38°10', 동경 128°21'~129°21'에 위치하고 있으며 암석질과 모래로 이루어지는 해안선은 길이가 212.3 km에 이른다. 이 지역은 Tsushima 暖流의 약한 지류인 東鮮暖流(East Korean Warm Current)가 남쪽에서 북상하여서, 북쪽에서 남하하는 Liman寒流의 지류인 北鮮寒流(North Korean Cold Current)와 만나는 곳으로 (Kang 1966; Taniguti 1981), 해수의 표면온도는 거진해안에서 2월의 평균온도가 3.39°C로 최저이고 주문진 해안에서 8월의 평균온도가 23.13°C로 최고이다 (한국해양조사연보, 1983). 海岸線은 단조롭고 外海와 직접적으로 접촉하고 있어서 파도의 영향을 끊임없이 받게 되고, 조석 간만의 차는 0.

3m~0.4m로 작아서 조간대의 폭이 협소하다.

강원도 해역의 해조류에 관한 연구는 Okamura(1915a, 1915b, 1917)의 「朝鮮 東海岸의 海藻 第一~第三」에서 시작된다(참조; Lee, 1984). 식물지리학적으로 그 후 Kang(1966)은 이 지역을 「동해남구(Southern East Coast Section)」에 포함시켰으나, Taniguti(1981)는 온대구와 한대구의 경계로서 식생이 빈약하다고 보고하였고, Boo와 Lee(1986)는 R/P값을 근거로하여 속초 해역의 해조상은 난온대역(Warm temperate region)과 냉온대역(Cold temperate region)의 중간형이라고 주장하였다.

한편 Kim등(1983)과 Boo(1985b) 및 Chung(1986)은 이 해역 해조류의 수직분포를 연구하

였고, Koh(1983)와 Koh와 Sung(1983), Nam (1986) 및 Ahn(1984)은 조하대의 해조식생과 환경과의 관계를 연구하였다. 이 밖에도 식물상 조사, 미기록종 기재 및 계통분류학적 연구들이 이 해역을 포함하여 수행되어 왔다(Rho, 1958; Lee, 1972; Lee and Lee, Y., 1974; Yoo, 1975; Yoo *et al.*, 1976; Sohn and Kang, 1978; Park, 1976, 1980; Boo and Lee, 1984; Nam and Kang, 1984; Suh and Lee, 1984; Boo, 1985a; Nam *et al.*, 1985; Ahn, 1986; Boo and Choi, 1986; Boo and Lee, 1986; Choi, 1986; Han, 1986; Kim, 1986; Nam, 1986; Yoon, 1986; Lee, 1987; Lee, Y., 1987; Kim, 1988). 본 연구는 본 해역에 生育하는 해조류의 목록을 정리하고, 조간대의 하계 해조류 수직분포형을 근거로 하여, 이 지역 해조류의 수평분포와 수직분포의 형을 검토하는데 목적이 있다.

**재료 및 방법**

본 해역에 生育하는 해조류의 목록은 지금까지 이 해역에서 수행된 문헌들을 근거로 하여 작성하였다(Tab. 1.). 수직분포의 조사는 1986

년 6월과 8월에 호산(37°11'N, 129°21'E), 장호(57°19'N, 129°16'E), 북평(37°28'N, 129°10'E), 속초(38°13'N, 128°36'E) 및 오호리(38°20'N, 128°32'E)에서 line transect method로 50cm×50cm 방형구를 연속적으로 놓으면서 조사하였다(Fig. 1).

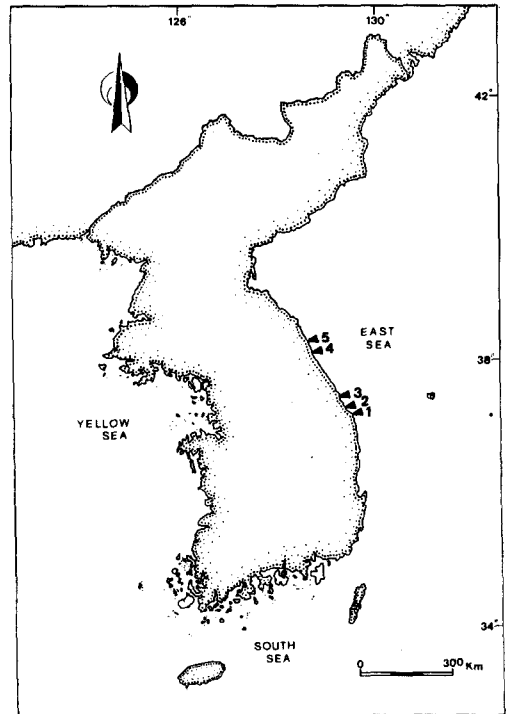


Fig. 1. Location of the study areas of Kangwon Province, east coast of Korea (1; Hosan, 2; Jangho, 3; Bukpyong, 4; Sokcho, 5; Ohori).

Table 1. Reports used for floral lists of marine algae in kangwon area

Reports	Reports
Okamura, 1915a, 1915b, 1917	Nam and Kang, 1984
Rho, 1958	Suh and Lee, 1984
Kang, 1966	Boo, 1985a, 1985b
Lee, 1972	Nam <i>et al.</i> , 1985
Lee and Lee, Y. 1974	Ahn, 1986
Yoo, 1975	Boo and Choi, 1986
Park, 1976, 1980	Boo and Lee, 1986
Yoo <i>et al.</i> , 1976	Choi, 1986
Sohn and Kang, 1978	Chung, 1986
Lee, 1981	Han, 1986
Kim <i>et al.</i> , 1983	Kim, 1986
Koh, 1983	Nam, 1986
Koh and Sung, 1983	Yoon, 1986
Ahn, 1984	Lee, 1987
Boo and Lee, 1984	Kim, 1988

**결과 및 고찰**

해조상 : Okamura(1915a)가 「朝鮮 東海岸의 海藻」에서 강원도 해역의 해조류 10종을 기재한 이후로 많은 연구자들이 이 해역에 生育하는 해조류를 추가 발표하여서(Tab. 2), 현재 남조류 9종, 녹조류 22종, 갈조류 55종, 홍조류 145종으로 도합 231종이 生育하는 것으로 정리된다(Tab. 2). 이를 한국의 전 연안에 生育하는 해조류와 분류군별로 비교하여 볼때 녹조류는 상대적으로 낮으나 갈조류는 높고 홍조류는 유사

**Table 2.** Species and reseachers' list on marine algae of Kangwon rocky shore**CYANOPHYTA**

1. *Agmenellum thermale* (Kutzing) Drouet et Daily : Lee (1981)
2. *Entophysalis conferta* (Kutzing) Drouet et Daily : Lee (1981)
3. *E. deusta* (Meneghini) Drouet et Daily : Lee (1981)
4. *Lyngbia confervoides* C. Agardh : Lee (1981), Boo & Lee (1986)
5. *L. majuscula* (Dillwyn) Harvey seq. Gomont : Lee (1981)
6. *L. semiplena* (C. Agardh) J. Agardh : Lee (1981)
7. *Kyrtuthrix masculans* (Gomomt) Umezaki : Lee (1981)
8. *Calothrix parasitica* (Chauvin) Thuret : Lee (1981)
9. *C. scopulorum* (Weber & Mohr) Agardh : Boo & Lee (1986)

**CHLOROPHYTA**

1. *Ulothrix flacca* (Dillwyn) Thuret : Kang (1966), Kim *et al* (1983)
2. *Monostroma grevillei* (Thuret) Wittrock : Kang (1966), Boo & Lee (1986)
3. *Enteromorpha clathrata* (Roth) Greville : Kang (1966)
4. *E. compressa* (Linne) Greville : Kang (1966), Kim *et al* (1983), Chung (1986), Nam (1986)
5. *E. crinita* (Roth) J. Agardh : Boo & Lee (1986)
6. *E. intestinales* (L.) Link : Kim *et al* (1983)
7. *E. linza* (L.) J. Agardh : Kang (1966), Kim *et al* (1983), Boo (1985b), Ahn (1986) Boo & Lee (1986)
8. *E. prolifera* (Oeder) J. Agardh : Kim *et al* (1983), Ahn (1986), Boo & Lee (1986)
9. *Ulva pertusa* Kjellman : Okamura (1915a), Rho (1958), Kim *et al* (1983), Koh (1983) Koh & Sung (1983), Boo (1985b), Boo & Lee (1986), Chung (1986) Nam (1986)
10. *Urospora penicilliformis* (Roth) Areschoug (= *Hormiscia penicilliformis* (Roth) Fries) : Kang (1966)
11. *Chaetomorpha area* (Dillwyn) Kutzing : Kang (1966)
12. *C. moniligera* Kjellman : Kang (1966), Kim *et al* (1983), Boo (1985b), Boo & Lee (1986)
13. *Cladophora albida* (Hudson) Kutzing : Kang (1966), Kim *et al* (1983), Boo (1985b), Boo & Lee (1986)
14. *C. japonica* Yamada : Rho (1958), Boo & Lee (1986), Chung (1986)
15. *C. opaca* Sakai : Kang (1966), Kim *et al* (1983), Boo & Lee (1986)
16. *C. pellucida* (Hudson) Kutzing : Rho (1958)
17. *C. uncinella* Harvey : Boo & Lee (1986)
18. *Bryopsis plumosa* (Hudson) C. Agardh : Rho (1958), Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Chung (1986), Nam (1986)
19. *Caulerpa okamurae* Weber Van Bosse : Chung (1986)
20. *Codium adhaerens* (Cabrera) C. Agardh : Kang (1966), Kim *et al* (1983), Boo & Lee (1986) Chung (1986), Nam (1986)
21. *C. fragile* (Suringar) Hariot : Kang (1966), Kim *et al* (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
22. *C. mucronatum* var. *californicum* J. Agardh : Okamura (1915a)

**PHAEOPHYTA**

1. *Acinetospora crinita* (Harvey) Kornmann (= *A. pusilla* (Griffiths) Bornet) : Nam (1986)
2. *Ectocarpus arctus* Kutzing (= *E. confervoides* (Roth) Le Jolis) : Kim *et al* (1983)
3. *Giffordia mitchellae* Harvey (= *Ectocarpus mitchellae* Harvey) : Boo & Lee (1986)
4. *Analipus japonicus* (Harvey) Wynne (= *Heterochordaria ambientina* (Ruprecht) Setchell et Gardner) : Kang (1966), Kim *et al* (1983)

5. *Papenfussiella kuromo* (Yendo) Inagaki f. *kuromo* Inagaki : Kang (1966)
6. *Sphaerotrachia divaricata* (C. Agardh) Kylin : Kang (1966)
7. *Elachista globosa* Takamatsu : Chung (1986)
8. *E. taeniaeformis* Yamada : Boo & Lee (1986)
9. *E. tenuis* Yamada : Yoo *et al* (1979), Kim *et al* (1983)
10. *Halothrix ambigua* Yamada : Nam (1986)
11. *Leathesia difformis* (L.) Areschoug : Kang (1966), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
12. *L. pulvinata* Takamatsu : Boo & Lee (1986)
13. *Colpomenia bullosa* (Saunders) Yamada : Boo (1985), Boo & Lee (1985)
14. *C. sinuosa* (Roth) Debres et Solier : Rho (1958), Kang (1966), Kim *et al* (1983), Boo (1985), Boo & Lee (1986), Chung (1986), Nam (1986)
15. *Hydroclathrus clathratus* (C. Agardh) Howe : Rho (1958), Boo & Lee (1986)
16. *Scytosiphon lomentaria* (Lyngbye) Link : Kang (1966), Kim *et al* (1983), Boo (1985a), Boo & Lee (1986), Chung (1986)
17. *Petalonia fascia* (O.F. Muller) Kuntze : Kang (1966), Kim *et al* (1983), Boo & Lee (1986)
18. *Petalonia bingamiae* (J. Agardh) Vinogradova (= *Endarachne bingamiae* J. Agardh) : Kang (1966)
19. *Cutleria cylindrica* Okamura : Kang (1966), Boo & Lee (1966), Nam (1986)
20. *Sphacelaria californica* Sauvageau : Boo & Choi (1986)
21. *S. divaricata* Montagne : Boo & Lee (1986)
22. *S. fusca* Agardh : Boo & Choi (1986), Boo & Lee (1986), Chung (1986)
23. *S. linearis* Takamatsu : Nam (1986)
24. *Punctaria latifolia* Greville : Kang (1966)
25. *Undaria pinnatifida* (Harvey) Suringar : Rho (1958), Kim *et al* (1983), Koh (1983), Boo (1985b), Boo & Lee (1986), Nam (1986) Kang (1966).
26. *Agarum cribrosum* Bory f. *yakishiriense* I. Yamada : Kang (1966), Kim *et al* (1983), Boo & Lee (1986)
27. *Costaria costata* (Turner) Saunders : Rho (1958), Kang (1966), Kim *et al* (1983), Koh (1983), Koh & Sung (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986), as *C. turner* Greville : Okamura (1917)
28. *Kjemaniella crassifolia* Miyabe : Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Chung (1986)
29. *Laminaria japonica* Areschoug : Kim *et al* (1983), Koh (1983), Koh & Sung (1983)
30. *L. ochotensis* Miyabe : Okamura (1917), Rho (1958)
31. *L. religosa* Miyabe : Rho (1958), Nam *et al* (1985), Nam (1986)
32. *Dictyota dichotoma* (Hudson) Lamouroux : Okamura (1917), Kang (1966), Kim *et al* (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
33. *D. linearis* (C. Agardh) Greville : Nam (1986)
34. *Dictyopteris divaricata* Okamura : Rho (1958), Kang (1966), Kim *et al* (1983), Koh (1983), Koh & Sung (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
35. *Dilophus okamurae* Dawson : Kang (1966), Kim *et al* (1983)
36. *Pachydictyon coriaceum* (Holmes) Okamura : Kang (1966)
37. *Spathoglossum pacificum* Yendo : Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Chung (1986), Nam (1986)
38. *Cocophora langsdorfii* (Turner) Greville : Okamura (1915a), Kang (1966), Yoo (1975), Kim *et al* (1983), Boo & Lee (1986), Chung (1986), Nam (1986)
39. *Cystoseira hakodatensis* (Yendo) Fensholt (= *Cystophyllum hakodatense* Yendo) : Okamura (1917), Rho (1958), Kang (1966)
40. *Pelvetia siliquosa* Tseng et Chang (= *P. wrightii* (Harvey) Yendo) : Okamura (1917)
41. *Hizikia fusiformis* (Harvey) Okamura : Rho (1958), Kang (1966), Yoo (1975), Kim *et al* (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)

42. *Sargassum confusum* C. Agardh : Kang (1966), Yoo (1975), Kim *et al* (1983), Koh (1983), Koh & Sung (1983), Ahn (1984), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
43. *S. fulvellum* (Turner) C. Agardh : Chung (1986)
44. *S. hemiphyllum* (Turner) C. Agardh : Kim *et al* (1983)
45. *S. horneri* (Turner) C. Agardh : Kang (1966), Yoo (1975), Kim *et al* (1983), Koh (1983), Boo & Lee (1986), Chung (1986), Nam (1986)
46. *S. miyabe* Yendo (= *S. kjellmanianum* Yendo) : Kang (1966), Yoo (1975), Kim *et al* (1983), Boo & Lee (1986)
47. *S. nigrifolium* Yendo : Yoo (1975), Kim *et al* (1983)
48. *S. nipponicum* Yendo : Kim *et al* (1983)
49. *S. patens* C. Agardh : Nam (1986)
50. *S. sagamianum* Yendo : Rho (1958), Kang (1966), Yoo (1975), Boo (1985), Chung (1986), Nam (1986)
51. *S. serratifolium* (C. Agardh) C. Agardh : Kang (1966), Yoo (1975)
52. *S. siliquastrum* (Turner) C. Agardh : Kang (1966), Yoo (1975), Kim *et al* (1983), Nam (1986)
53. *S. thunbergii* (Roth) Kuntze : Okamura (1917), Kang (1966), Yoo (1975), Kim *et al* (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
54. *S. yezoense* (Yamada) Yoshida et T. Konno : Boo & Lee (1986)

## RHODOPHYTA

1. *Erythrotrichia carnea* (Dillwyn) J. Agardh : Nam (1986)
2. *Bangia atropurpurea* (Roth) C. Agardh (= *B. fusco-purpurea* (Dillwyn) Lyngbye) : Roh (1958), Kang (1966), Kim *et al* (1983), Boo & Lee (1986)
3. *Porphyra pseudolinearis* Ueda : Rho (1958), Kang (1966)
4. *P. suborbiculata* Kjellman : Nam (1986)
5. *P. yezoensis* Ueda : Rho (1958), Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Nam (1986)
6. *Acrochaetium catenulatum* Howe : Lee (1987)
7. *A. moniliforme* (Rosenvinge) Borgesen : Lee (1987)
8. *A. virgatulum* (Haervey) Bornet : Lee (1987)
9. *Auduinella densa* (Drew) Garbary (= *Rhodochorton densum* Drew) : Nam (1986)
10. *A. robusta* (Borgesen) Garbary (= *Rhodochorton robustum* (Borgesen) Nakamura) : Kang (1966), Lee & Lee (1974), Boo & Lee (1986)
11. *A. santae-thome* (Borgesen) Garbary (= *Rhodochorton santae-thome* (Borgesen) Nakamura) : Nam (1986)
12. *A. terminalis* (Nakamura) Garbary (= *Rhodochorton terminale* Nakamura) : Nam (1986)
13. *Helminthocladia yendoana* Narita : Kang (1966)
14. *Nemalion vermicularae* Suringar : Kang (1966), Boo & Lee (1986), Chung (1986), Nam (1986)
15. *Pseudogloiophloea okamurai* (Setchell) Chihara (= *Gloiophloea okamurai* Setchell) : Kang (1966)
16. *Bonnemaisonia hamifera* Hariot : Kang (1966), Kim *et al* (1983), Koh (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Chung (1986)
17. *Palmaria palmata* (L.) O. Kuntze : Rho (1958)
18. *Gelidium amansii* (Lamouroux) Lamouroux : Kang (1966), Sohn & Kang (1978), Kim *et al* (1983), Boo & Lee (1986), Chung (1986), Nam (1986)
19. *G. pusillum* (Stackhouse) Le Jolis : Kang (1966), Sohn & Kang (1978), Chung (1986)
20. *G. vagum* Okamura : Nam (1986)
21. *Pterocladia densa* Okamura : Sohn & Kang (1978)
22. *P. capillacea* (Gmelin) Bornet (= *P. tenuis* Okamura) : Rho (1958), Kang (1966), Nam (1986)
23. *Dumontia simplex* Cotton : Kang (1966), Kim *et al* (1983), Boo (1985b), Boo & Lee (1986)
24. *Hyalosiphonia caespitosa* Okamura : Kang (1966), Boo & Lee (1986), Chung (1986), Nam (1986)
25. *Fosliella zostericola* (Foslie) Segawa (= *Heteroderma zostericola* Foslie) : Park (1976, 1980)

26. *Lithophyllum okamurae* Foslie f. *japonica* Foslie : Kim et al (1983), Chung (1986)
27. *Alatocladia modesta* (Yendo) Johansen : Chung (1986)
28. *Corallina officinalis* Linne : Kang (1966), Kim et al (1983)
29. *C. pilulifera* Postels et Ruprecht : Kang (1966), Kim et al (1983), Boo (1985b), Chung (1986), Nam (1986)
30. *Yania yenoshimensis* (Yendo) Yendo : Chung (1986)
31. *Marginisporium aberrans* (Yendo) Johansen et Chihara (= *Amphiroa aberrans* Yendo) : Nam (1986)
32. *Bossiaella cretacea* (Postels et Ruprecht) Johansen (= *Pachyarthron cretaceum* (Postelset Ruprecht)) Manza : Kang (1966), Kim et al (1983)
33. *Amphiroa cretaceum* Endl. : Okamura (1917), Rho (1958)
34. *Carpopeltis affinis* (Harvey) Okamura : Kim et al (1983), Lee (1987)
35. *C. cornea* (Okamura) Okamura (= *Zanardinula cornea* (Okamura) Dawson) : Kang (1966), Boo (1985b), Chung (1986)
36. *Grateloupia divaricata* Okamura : Kim et al (1983), Boo (1985b), Boo & Lee (1986), Chung (1986)
37. *G. filicina* (Lamouroux) C. Agardh : Kang (1966), Kim et al (1983), Koh & Sung (1983), Boo & Lee (1986), Nam (1986)
38. *G. livida* (Harvey) Yamada : Kang (1966), Boo & Lee (1986)
39. *G. okamurae* Yamada : Kang (1966), Kim et al (1983), Boo & Lee (1986), Chung (1986), Nam (1986)
40. *G. prolongata* J. Agardh : Kim et al (1983), Nam (1986), Lee (1987)
41. *G. sparsa* (Okamura) Chiang (= *Phyllymenia sparsa* (Okamura) Kylin) : Kang (1966), Boo & Lee (1986), Nam (1986)
42. *G. turuturu* Yamada : Kang (1966), Kim et al (1983), Boo (1985b), Boo & Lee (1986), Nam (1986), Lee (1987)
43. *Halymenia acuminata* (Holmes) J. Agardh : Nam (1986), Lee (1987)
44. *Halymeniopsis dilatata* Yamada : Nam (1986)
45. *Pachymeniopsis elliptica* (Holmes) Yamada : Koh (1983), Koh & Sung (1983), Chung (1986), Lee (1987)
46. *P. lanceolata* (Okamura) Yamada : Kang (1966), Kim et al (1983), Boo & Lee (1986), Chung (1986), Nam (1986)
47. *P. yendoi* Yamada : Boo (1985b), Nam (1986)
48. *Prionitis patens* Okamura : Boo & Lee (1986)
49. *Gloiopeltis furcata* (Postels et Ruprecht) J. Agardh : Kang (1966), Kim et al (1983), Boo (1985b), Boo & Lee (1986)
50. *Tichocarpus crinitus* (Gmeline) Ruprecht : Okamura (1917) Kang (1966), Kim et al (1983), Boo & Lee (1986)
51. *Callophyllis japonica* Okamura : Nam (1986)
52. *Schizymenia dubyi* (Chauvin) J. Agardh : Kang (1966)
53. *Tsengia nakamurae* (Yendo) Fan et Fan (= *Nemastoma nakamurae* Yendo) : Kang (1966)
54. *Caulacanthus okamurae* Yamada : Kang (1966), Kim et al (1983), Boo & Lee (1986)
55. *Plocamium telfairiae* Harvey : Kim et al (1983), Chung (1986)
56. *Hypnea saidana* Holmes : Kim et al (1983)
57. *Phacerothecium japonicum* Okamura : Boo & Lee (1986)
58. *Gymnogongrus flabelliformis* Harvey : Okamura (1917), Rho (1958), Kang (1966), Kim et al (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
59. *Chondrus armatus* (Harvey) Okamura : Rho (1958)
60. *C. pinnulatus* f. *armatus* (Harvey) Yamada et Mikami : Koh (1983), Nam (1986)
61. *Chondrus crispus* Stackhouse : Nam (1986)
62. *C. ocellatus* Holmes : Okamura (1915a), Rho (1958), Kang (1966), Koh (1983), Koh & Sung (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
63. *Gigartina intermedia* Suringar : Kang (1966), Boo & Lee (1986), Chung (1986), Nam (1986)
64. *G. teedii* (Roth) Lamouroux : Kang (1966), Kim et al (1983)

65. *G. tenella* Harvey : Kang (1966), Kim *et al* (1983), Chung (1986), Nam (1986)
66. *Chrysimenia wrightii* (Harvey) Yamada : Nam (1986)
67. *Rhodymenia intricata* (Okamura) Okamura : Kim *et al* (1983), Nam (1986)
68. *R. pertusa* (Postels et Ruprecht) J. Agardh : Okamura (1915b, 1917), Rho (1958), Kang (1966), Kim *et al* (1983), Koh (1983)
69. *Bingamia californica* J. Agardh : Kim *et al* (1983), Boo & Lee (1983)
70. *Lomentaria catenata* Harvey : Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Chung (1986)
71. *L. hakodatensis* Yendo : Kang (1966), Kim *et al* (1983), Koh & Sung (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
72. *L. lubrica* (Yendo) Yamada : Nam (1986)
73. *Champia parvula* (C. Agardh) Harvey : Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Chung (1983), Nam (1983)
74. *Anotrichum furcellatum* (J. Agardh) Baldock : Chung (1986)
75. *Antithamnion nipponicum* Yamada et Inagaki : Kang (1966), Kim *et al* (1983), Boo (1985a), Boo & Lee (1986), Chung (1986), Nam (1986)
76. *A. sparsum* Tokida : Boo (1985a), Boo & Lee (1986)
77. *Antithamnionella miharae* (Tokida) Itono : Boo (1985a), Boo & Lee (1986)
78. *Callithamnion callophillidicola* Yamada : Boo (1985a), Boo & Lee (1986)
79. *Campylaeophora crassa* (Okamura) Nakamura : Kang (1966), Kim *et al* (1983), Boo (1985a), Boo & Lee (1986), Chung (1986)
80. *C. hypnaeoides* J. Agardh : Boo (cast ashore, unpublished data)
81. *Centroceras clavulatum* (C. Agardh) Montagne : Okamura (1915a), Rho (1958)
82. *Ceramium aduncum* Nakamura : Kim *et al* (1983), Suh & Lee (1984), Boo (1985a), Boo & Lee (1986)
83. *C. boydenii* Gepp : Chung (1986), Nam (1986)
84. *C. cimbricum* Petersen : Kang (1966)
85. *C. codii* (Richards) Mazoyer : Boo (1985a)
86. *C. kondoi* Yendo : Kim *et al* (1983), Suh & Lee (1984), Boo (1985a), Nam (1986)
87. *C. japonicum* Okamura : Kang (1966), Kim *et al* (1985), Boo (1985a), Chung (1986), Nam (1986)
88. *C. paniculatum* Okamura : Suh & Lee (1984), Boo (1985a), Chung (1986)
89. *C. tenerrimum* (Martens) Okamura : Suh & Lee (1984), Boo (1985a), Nam (1986)
90. *C. tenuissimum* (Roth) J. Agardh : Nam (1986)
91. *Griffithsia coacta* Okamura : Kim *et al* (1983)
92. *G. heteroclada* Yamada et Hasegawa : Boo & Lee (1986), Chung (1986)
93. *G. japonica* Okamura : Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Chung (1986)
94. *Herpochondria dentata* (Okamura) Itono (= *Microcladia dentata* Okamura) : Boo (1985b)
95. *Platythamnion yezoense* Inagaki : Boo (1985a), Boo & Lee (1986)
96. *Psilothalia dentata* (Okamura) Kylin : Kim *et al* (1983)
97. *Spyridia elongata* Okamura : Boo & Lee (1984, 1986)
98. *Tiffaniella suyehiroi* (Okamura) Kaneko : Kim (1988)
99. *Acrosorium polyneurum* Okamura : Kim *et al* (1983), Koh & Sung (1983), Chung (1986), Nam (1986)
100. *A. uncinatum* (Turner) Kylin : Kang (1966)
101. *A. yendoi* Yamada : Kang (1966), Kim *et al* (1983), Boo (1985a), Boo & Lee (1986), Chung (1986), Nam (1986)
102. *Congregatocarpus pacificus* (Yamada) Mikami (= *Laingia pacifica* Yamada) : Rho (1958)
103. *Delesseria serrulata* Harvey (= *D. violacea* (Harvey) Kylin) : Okamura (1915b), Rho (1958), Kang (1966), Kim *et al* (1983), Koh (1983), Boo & Lee (1986), Nam (1986)
104. *D. crassifolia* Ruprecht : Okamura (1917)

105. *Hypoglossum barbatum* Okamura : Chung (1986)
106. *Marionella schmitziana* (De Toni et Okamura) Yoshida (= *Hemineura schmitziana* De Toni et Okamura) : Kang (1966), Chung (1986)
107. *Neoholmesia japonica* (Okamura) Mikami (= *Holmesia japonica* (Okamura) Okamura) : Kang (1966), Kim *et al* (1983)
108. *Schizoseris subdichotoma* (Segawa) Yamada : Boo & Lee (1986), Chung (1986)
109. *Sorella repens* (Okamura) Hollenberg (= *Erythroglossum repens* Okamura) : Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Kim (1986), Chung (1986)
110. *Dasya collabens* Hooker et Harvey : Boo & Lee (1986), Chung (1986)
111. *D. sessilis* Yamada : Kim *et al* (1983), Boo & Lee (1986), Chung (1986), Nam (1986)
112. *Enelittosiphonia hakodatensis* (Yendo) Segi : Lee (1972), Kim *et al* (1983), Boo & Lee (1986)
113. *Heterosiphonia japonica* Yendo : Kang (1966), Kim *et al* (1983), Koh (1983), Koh & Sung (1983), Boo & Lee (1986), Chung (1986), Han (1986), Nam (1986)
114. *H. pulchra* (Okamura) Falkenberg : Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Chung (1986), Han (1986), Nam (1986)
115. *Benzaitenia yenoshimensis* Yendo : Boo & Lee (1986), Chung (1986)
116. *Janczewskia morimotoi* Tokida : Nam (1986)
117. *Laurencia composita* Yamada : Rho (1958)
118. *L. intermedia* Yamada : Kim *et al* (1983), Koh & Sung (1983)
119. *L. intricata* Lamouroux : Nam (1986)
120. *L. nipponica* Yamada : Nam & Kang (1984), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
121. *L. obtusa* (Hudson) Lamouroux : Nam (1986)
122. *L. okamurae* Yamada : Kim *et al* (1983)
123. *L. undulata* Yamada : Chung (1986)
124. *L. venusta* Yamada : Kim *et al* (1983)
125. *Neorhodomela aculeata* (Perestenko) Masuda (= *Rhodomela larix* (Turner) C. Agardh) : Boo & Lee (1986)
126. *Rhodomela macrocantha* (Kutzing) Setchell : Rho (1958)
127. *R. licopodioides* (L.) Agardh : Okamura (1917)
128. *Odonthalia corymbifera* (Gmelin) Greville : Okamura (1915b), Kang (1966), Kim *et al* (1983), Boo & Lee (1986)
129. *Polysiphonia decumbens* Segi : Yoon (1986)
130. *P. fragilis* Suringar : Rho (1958)
131. *P. harandii* Harvey (= *P. spinosa* (C. Agardh) J. Agardh) : Kang (1966), Nam (1986), Yoon (1986)
132. *P. japonica* Harvey : Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Chung (1986), Yoon (1986)
133. *P. morrowii* Harvey (= *P. senticulosa* Harvey, = *P. urceolata* (Dillwyn) Greville) : Okamura (1917), Rho (1958), Kang (1966), Kim *et al* (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
134. *P. notoensis* Segi : Kang (1966), Kim *et al* (1983)
135. *P. sphaerocarpa* Borgesen : Yoon (1986)
136. *P. subtilissima* Montagne : Nam (1986)
137. *P. tongatensis* Kutzing : Nam (1986)
138. *P. yendoi* Segi : Kang (1966)
139. *P. utricularis* Ganaid : Okamura (1915b)
140. *Symphyclocladia latiuscula* (Harvey) Yamada : Kang (1966), Kim *et al* (1983), Koh (1983), Boo (1985b), Boo & Lee (1986), Choi (1986), Chung (1986), Nam (1986)
141. *S. linearis* (Okamura) Falkenberg : Okamura (1915b), Kang (1966), Kim *et al* (1983), Boo & Lee (1986), Choi (1986)
142. *S. marchantioides* (Harvey) Falkenberg : Kang (1966), Kim *et al* (1983), Choi (1986), Chung (1986)



- 143. *Chondria crassicaulis* Harvey : Kang (1966), Kim *et al* (1983), Boo (1985b), Boo & Lee (1986), Chung (1986), Nam (1986)
- 144. *C. dasyphylla* (Woodward) C. Agardh : Nam (1986)
- 145. *Botryocarpus japonica* Okamura : Okamura (1915b)

하여서(Fig. 2), 이 해역이 한국의 다른 해역보다 수온이 낮은 지역임을 시사한다(Feldman, 1937). 이 해역의 해조상을 대표할 수 있는 지역표징종(locally abundant species with restricted distribution, Tseng, 1983-84)들은 마른나무(*Tichocarpus crinitus*), 개다시마(*Kjellmaniella crassifolia*), 참빛풀(*Odonthalia corymbifera*), 산말(*Desmarestia ligulata*), 쇠미역(*Costaria costata*), 삼나무말(*Cocophora langsdorfii*)등의 북방계종(boreal species)으로 인식되고 있다(Kang, 1966; Boo and Lee, 1986). 특히 국수나물(*Nemalion vermicularae*)은 남해안의 방죽포에서 봄철에 출현하지만(Go and Sohn, 1976), 위도상으로 3°이상 북쪽에 위치한 강원 해역에서는 7월과 8월에 번무하여서(Boo and Lee, 1986), 수온의 차이를 계절적 변화로 극복하는 특징은 중분포론적으로 볼때 대단히 흥미로운 사실이라고 생각된다. 그러나 단 하나의 종이기는 하나 남방계의 식물인 옥덩굴(*Caulerpa okamurae*)이 갈라연안까지 북상하여서 조하대에 번무한다는 사실은(Chung, 1986)

이 해역의 해조상의 성격이 단순하지 않음을 보여주고 있다고 할 수 있다.

한편 패(*Ishige okamurae*), 넓패(*I. sinicola*), 바위수염(*Myelophycus simplex*), 뜰부기(*Pelvetia siliquosa*)등의 갈조류들은 강원해역에서는 관찰되지 않으나 南海岸과 西海岸 및 제주도에서는 조간대의 표징종으로 생육하고 있는 점에서(Lee and Lee, Y, 1976; Lee and Boo, 1981; Kim, 1983; Sohn *et al*, 1983), 이들을 강원해역의 해조상의 獨特性을 표현하는 negative characteristic species들로 구분지을 수 있을 것이다. 한편 Boo와 Lee(1986)는 속초해역의 해조 군집은 冬-春季(1~5월), 夏季(6~9월), 秋季(10~12월)로 구별되는 3계절성의 특징을 가지며 이는 이 해역의 수온변화에 기인한다고 보고 하였다.

수직분포 : 수직분포는 식물군집의 가장 중요한 속성의 하나로서 해조류의 경우 전조나 광선에 대한 노출, 경쟁등의 환경요인들에 의하여 결정된다(Dring, 1982). 강원 해역에서 6월의 조간대 해조류 수직분포는 조간대 상부에서 불

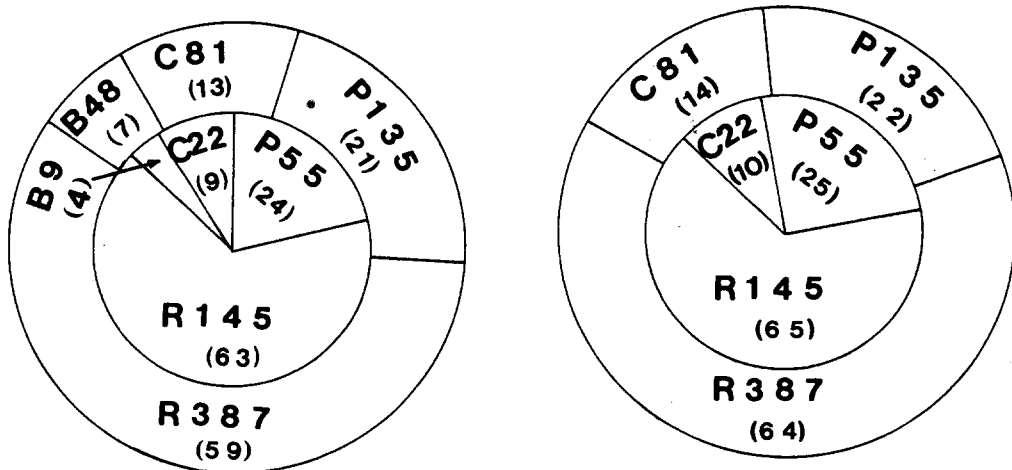


Fig. 2 Species number and its percentage with parenthesis of higher taxa of marine algae of Kangwon area (B; Cyanophyta, R; Rhodophyta, P; Phaeophyta, C; Chlorophyta.) The inner circle exhibits Kangwon flora and the outer circle exhibits Korean flora.

Table 3. Vertical distribution patterns of marine algae at Kangwon rocky shore

Area investigated	Tidal zone	Representative taxa	Month
Jangho	Upper	<i>Gloiopeltis furcata</i> - <i>Chaetomorpha moniligera</i>	June
	Mid-lower	<i>Hizikia fusiforme</i> - <i>Chondria crassicaulis</i> - <i>Chondrus ocellatus</i> , <i>Symphycloadia latiuscula</i> - <i>Pachymeniopsis</i> spp., <i>Sargassum sagamianum</i>	
Sohcho	Upper	<i>Nemalion vermicularae</i> - <i>Cladophora opaca</i>	June
	Mid-lower	<i>Polysiphonia morrowi</i> , <i>Corallina pilulifera</i> - <i>Sargassum sagamianum</i>	
Hosan	Upper	<i>Nemalion vermicularae</i> - <i>Cladophora opaca</i>	August
	Mid-lower	<i>Hizikia fusiforme</i> - <i>Corallina pilulifera</i> , <i>Dictyota dichotoma</i> - <i>Sargassum sagamianum</i> , <i>Undaria pinnatifida</i>	
Bukpyong	Upper	<i>Enteromorpha compressa</i> - <i>Nemalion vermicularae</i>	August
	Mid-lower	<i>Polysiphonia morrowi</i> , <i>Corallina pilulifera</i> , <i>Chondria crassicaulis</i> - <i>Pachymeniopsis</i> spp.	
	Upper	<i>Nemalion vermicularae</i> , <i>Chaetomorpha moniligera</i>	August
	Mid-lower	<i>Hizikia fusiforme</i> , <i>Leathesia difformis</i> , <i>Corallina pilulifera</i> - <i>Sargassum</i> spp., <i>Undaria pinnatifida</i>	

등가사리 (*Gloiopeltis furcata*), 염주말 (*Chaetomorpha moniligera*), 국수나물 (*Nemalion vermicularae*), 흐린대마디말 (*Cladophora opaca*) 등이 우점종을 이루며, 조간대 중하부는 툯 (*Hizikia fusiforme*), 작은구슬산호말 (*Corallina pilulifera*), 모로우붉은실 (*Polysiphonia morrowi*), 서실 (*Chondria crassicaulis*) 등이 우점하고 조하대에는 도박류 (*Pachymeniopsis* spp.)와 비틀대모자반 (*Sargassum sagamianum*)이 우점한다. 8월의 경우 조간대 상부는 국수나물 (*N. vermicularae*)이 뚜렷하게 우점하는 것이 특징이며, 조간대 중하부 및 조하대는 6월의 경우와 유사하다 (Tab. 3). Kim 등 (1983)은 강릉 안인연안의 해조류 군집의 수직분포를 4월과 10월에 각각 조사하여 조간대 상부는 염주말 (*C. moniligera*), *Enteromorpha*-*Cladophora* 群으로, 조간대 중부는 지층이 (*Sargassum thunbergii*), 조간대 하부는 개그물바탕말 (*Dilophus okamurae*)로 대표된다고 보고하였다. Chihara (1957)는 일본 관동지방의 해조류의 帶狀分布는 비말대에 애기불등가사리 (*Gloiopeltis complanata*), 潮間帶 上部에 홑파래 (*Monostroma nitidum*)와 불등가사리 (*G. furcata*), 조간대 중부에 바위수염 (*Myelophycus simplex*), 패 (*Ishige okamurae*), 넓패 (*I. sinicola*)가, 조간대 하부에는 지층이 (*S. thunbergii*)와 툯 (*H.*

*fusiforme*)으로 특징지어 구분하였다. 한국의 경우 남해안 동북쪽에는 조간대 상부에 둥근돌김 (*P. suborbiculata*), 넓은홑파래 (*Monostroma latissimum*), 불등가사리 (*G. furcata*), 잎파래 (*E. linza*)가 繁茂하고 조간대 중부에는 바위수염 (*M. simplex*), 패 (*I. okamurae*), 구멍갈파래 (*U. pertusa*), 조간대 하부에는 지층이 (*S. thunbergii*)와 툯 (*H. fusiforme*), 작은구슬산호말 (*C. pilulifera*)이 우점하며 (Kang, 1974), 여름철의 경우는 특히 뜸부기 (*P. siliquosa*)가 번무한다 (Sohn et al, 1982; Lee et al, 1983). 江原海域과 동일한 위도상에 위치한 울릉도의 경우 垂直分布는 상부에서부터 *Enteromorpha* spp.-*Corallina pilulifera*-*Laurencia* spp.-*S. sagamianum*-*Eisenia bicyclis*의 順序로 帶狀分布하며 독도의 경우는 *Enteromorpha* spp.-*Corallina* spp.-*Laurencia* spp.-*Dictyopteria prolifera*-*Sargassum nipponicum*-*Eisenia bicyclis*로 대상분포한다 (Lee and Boo, 1981).

이와같은 사실로 볼때 강원해역 해조류의 수직분포는 다른 해역의 조간대에서 흔히 출현하는 바위수염 (*M. simplex*), 패 (*I. okamurae*), 넓패 (*I. sinicola*), 뜸부기 (*P. siliquosa*)가 우세한 층위 (stratification)가 없으며 또한 이 위치를 대체하고 있는 다른 종들도 뚜렷이 관찰되지 않는

점에서 특이하다. 다만 국수나물(*N. vermicularae*)이나 염주말(*C. moniligera*)층 아래로 흐린대마디말(*Cladophora opaca*)과 모로우불은실(*Polysiphonia morrowi*) 층이 출현하고 있으나, 그 폭이 매우 협소하고, 또한 이들을 중심으로한 층위는 그 상부와 하부의 식생층에 비하여 층위의 발달정도가 매우 미약하여서 이를 조간대 중부의 표징종으로 인식하기에는 미흡하다고 판단된다. Boo(1985)는 강릉 안인해역의 조간대 해조식생을 4월에서 6월까지 line transect 방법으로 조사하고, 각 방형구에 출현하는 종들을 대상으로 cluster analysis를 하여 식생의 층위를 구분한 결과, 이 지역의 조간대는 녹색대의 상부와 적갈색대의 중하부, 즉 2개의 층위로 대별된다고 보고하였다.

따라서, 강원 해역의 해조류의 垂直分布는 일본의 관동지방이나 남해안과는 뚜렷이 다르고 오히려 울릉도나 독도의 해조식생형과 유사함을 알 수 있다. 이는 두 지역에서 서로 조석간만의 차가 0.3m 이내로 작다는 점에서 기인하는 것으로 판단된다. 그러나 독도나 울릉도의 境遇 강원 해역에 繁茂하는 국수나물(*N. vermicularae*)과 염주말(*C. moniligera*)이 없다는 점에서(Lee and Boo, 1981) 본 조사지역과 다르고 이 점은 추후 재검토되어야 한다고 판단된다.

끝으로 본 論文을 정리하도록 지도와 비평을 하여주신 서울대학교 李仁圭教授님께 깊이 감사드립니다.

## 적 요

강원해역의 해조상과 해조류의 수직분포가 검토되었다. 이 해역에 생육하는 해조류는 총 231종으로 남조류가 9종, 홍조류가 145종, 갈조류가 55종, 녹조류가 22종이다. 이 해역 해조상의 표징종은 삼나무말(*Cocophora langsdorfii*), 쇠미역(*Costaria costata*), 개다시마(*Kjellmaniella crassifolia*), 마른나무(*Tichocarpus crinitus*), 참빛풀(*Odonthalia corymbifera*)등이며 negative characteristic species들로는 패(*Ishige okamurae*), 넓

패(*I. sinicola*), 뜸부기(*Pelvetia siliquosa*)등이다. 조간대의 해조군집은 상부와 중하부의 2개로 구분되었다.

## 참 고 문 헌

- Ahn, I.Y. 1984. Growth pattern and productivity of *Sargassum confusum* (Phaeophyta, Sargassaceae) in Ohori on the east coast of Korea. Thesis M.S. SNU. 45 pp.
- Ahn, Y.S. 1986. A taxonomic study of *Enteromorpha linza* (Linne) J. Ag. and *E. prolifera* (Muller) J. Ag. (Chlorophyta) in Korea. Thesis M.S. SNU. 66 pp.
- Boo, S.M. 1985a. A systematic study on six tribes of Ceramiaceae (Rhodophyta, Ceramiales) in Korea. Thesis Ph. D. SNU. 449 pp.
- Boo, S.M. 1985b. Vertical distribution patterns of the intertidal algal community on a Kangreung rocky shore, east coast of Korea. Proc. Nat. Sci. Res. Inst. KANU. 1: 46-53.
- Boo, S.M. and Y.T. Choi. 1986. Two species of *Sphacelaria* new to Korea. Korean J. Phycol. 1: 95-101.
- Boo, S.M. and I.K. Lee. 1984. Two Korean species of *Spyridia* J. Agardh (Rhodophyta, Ceramiaceae). Korean J. Environ. Biol. 2: 59-64.
- Boo, S.M. and I.K. Lee. 1986. Studies on benthic algal community in the east coast of Korea. I. Floristic composition and periodicity of Sokcho rocky shore. Korean J. Phycol. 1: 107-116.
- Chihara, M. 1970. Common seaweeds of Japan in color. Hoikusha Publ. Co. Japan 173 pp.
- Choi, D.S. 1986. A taxonomic study on genus *Symphycoladia* (Rhodophyta) in Korea. Thesis M.S. SNU. 72 pp.
- Chung, H.S. 1986. An ecological study of algal community on a Gallam rocky shore eastern coast of Korea. Thesis M.S. KU. 56 pp.
- Dring, M.J. 1982. The biology of marine plants. Edward Arnold, Great Britain 199 pp.
- Feldmann, J. 1937. Recherches sur la vegetation marine de la Mediterranee. Rev. Alg. 10: 1-340.
- Go, N.P. and C.H. Sohn. 1976. Marine algal community of Bangjukpo. Jour. Mar. Biol. Chonnam Nat. Univ. 2: 21-28.

- Han, T.J. 1986. Morphology and reproduction of *Heterosiphonia pulchra* (Okamura) Falkenberg and *H. japonica* Yendo (Rhodophyta). Thesis M.S. SNU. 42 pp.
- Kang, J.W. 1966. On the geographical distribution of marine algae in Korea. Bull. Pusan Fish. Coll. 7: 1-125.
- Kang, J.W. 1974. Illustrated encyclopedia of fauna and flora of Korea. Vol. 8. Marine algae. Samwha Publ. Co. Korea 465 pp.
- Kim, H.S. 1988. A taxonomic study of four tribes (Griffithsiaceae, Compsothamniaceae, Spermothamniaceae and Dohrniellaceae) of Ceramiaceae, Rhodophyta in Korea. Thesis Ph. D. SNU. 395 pp.
- Kim, H.S., I.K. Lee, C.H. Koh, Y.B. Suh and N.K. Sung. 1983. Studies on the marine benthic communities in inter- and subtidal zones. I. Analysis of benthic community structures at Aninjin, east coast of Korea. Proc. Coll. Natr. Sci. SNU. 8: 71-108.
- Kim, K.H. 1986. A taxonomic study of *ErythroglOSSum minimum* Okamura and *Sorella repens* (Okam.) Hollenberg (Rhodophyte) in Korea. Thesis M.S. SNU. 53 pp.
- Kim, Y.H. 1983. An ecological study of algal communities in intertidal zone of Korea. Thesis Ph. D. SNU. 175 pp.
- Koh, C.H. 1983. Community structure and productivity of phytobenthos in Juckdo (east coast of Korea). II. Seasonal changes of algal vegetation in relation to annual growth of large brown algae. Korean J. Bot. 26: 181-190.
- Koh, C.H. and N. Sung. 1983. Community structure and productivity of phytobenthos in Juckdo (east coast of Korea). I. Benthic marine algal vegetation and its environment. Korean J. Bot. 26: 119-130.
- Lee, H.B. 1987. A systematic study of Halymeniaceae (Rhodophyta, Cryptonemiales) in Korea. Thesis Ph. D. SNU. 412 pp.
- Lee, I.K. 1972. Notes on marine algae from Korea. Korean J. Bot. 15: 13-22.
- Lee, I.K. 1984. A review on taxonomic studies of marine algae in Korea. Comm. Pap. for Prof. Y.H. Chung, Seoul pp. 305-335.
- Lee, I.K. and S.M. Boo. 1981. Marine algal flora of Ulreung and Dogdo Islands. Rep. KACN. 19: 201-214.
- Lee, I.K., H.B. Lee and S.M. Boo. 1983. A summer marine algal flora of islands in Jindo-gun. Rep. Sur. Natr. Environ. Korea 3: 291-312.
- Lee, I.K. and Y.P. Lee. 1974. Some members of *Rhodochorton* (Rhodophyta) in Korea. Korean J. Bot. 17: 36-52.
- Lee, K.W. 1981. Marine blue-green algae of Korea. I. East Coast. Rep. Education Minstr. 6 pp.
- Lee, Y.P. 1987. Taxonomy of the Rhodochortonaceae (Rhodophyta) in Korea. Korean J. Phycol. 2: 1-50.
- Lee, Y.P. and I.K. Lee. 1976. On the algal community in the intertidal belt of Jeju Island. I. Algal community of the spring season. Korean J. Bot. 19: 111-118.
- Nam, K.W. 1986. On the marine benthic algal community of Chuckdo in eastern coast of Korea. Korean J. Phycol. 1: 185-202.
- Nam, K.W. and J.W. Kang. 1984. The classification of genus *Laurencia* (Rhodophyta) in Korea. Bull. Nat. Fish. Univ. Pusan 24: 23-68.
- Nam, K.W., C.S. Lee, J.W. Chang and Y.C. Kim. 1985. Ecological studies on *Laminaria religiosa* Myabe of the coast in Kangwon province of Korea. Bull. Fish. Res. Dev. Agency 36: 89-103.
- Okamura, K. 1915a. On the marine algae of the east coast of Chosen I. Bot. Mag. Tokyo 29: 28-29.
- Okamura, K. 1915b. On the marine algae of the east coast of Chosen II. Bot. Mag. Tokyo 29: 205-207.
- Okamura, K. 1917. On the marine algae of the east coast of Chosen III. Bot. Mag. Tokyo 31: 76-78.
- Park, C.H. 1976. Studies on the Melobesioideae of Korea(I). Bull. Nat. Fish. Univ. Busan 16: 49-54.
- Park, C.H. 1980. The crustose coralline algae (Rhodophyta, Cryptonemiales) in Korea. Bull. Nat. Fish. Univ. Busan 20: 1-30.
- Rho, J.H. 1958. A preliminary survey of the marine algae in Korea. Rep. Coll. Univ. SKK. 3: 41-143.
- Sohn, C.H. and J.W. Kang. 1978. The classification of family Gelidiaceae (Rhodophyta) in Korea. Publ. Inst. Mar. Sci. Nat. Fish. Univ. Busan 11: 29-40.
- Sohn, C.H., I.K. Lee and J.W. Kang. 1982. Benthic marine algae of Dolsan Island in the southern coast of Korea I. Publ. Inst. Mar. Sci. Nat. Fish. Univ. Busan 14: 37-50.
- Sohn, C.H., I.K. Lee and J.W. Kang. 1983. Benthic marine algae of Dolsan-Island in the southern coast of Korea 2. Bull. Korean Fish. Soc. 4: 379-388.
- Suh, Y.B. and I.K. Lee. 1984. Morphology and reproduction of some species of *Ceramium* (Rhodophyta)

- in culture. Korean J. Bot. 27: 163-171.
- Taniguti, M. 1981. Distribution theory of marine algal vegetation in the Far East. Mar. Alg. Res. 22: 1-19.
- Tseng, C.K. 1983/84. Oceanographic factors and seaweed distribution. Oceanus 26: 49-56.
- Yoo, S.A. 1975. Some members of the Fucales (Phaeophyta) in Korea. Thesis M.S. SNU. 145 pp.
- Yoo, S.A., Y.H. Chung and I.K. Lee. 1976. *Elachista tenuis* Yamada (Phaeophyta) from Kangneung eastern coast of Korea. Korean J. Bot. 19: 92-94.
- Yoon, H.Y. 1986. A taxonomic study of genus *Poly-siphonia* (Rhodophyta) from Korea. Korean J. Phycol. 1: 3-86.

(1987. 11. 3 接授)