

Fig. 5 Body weight curves of F344 rats fed diet containing montmorillonite for 13 weeks

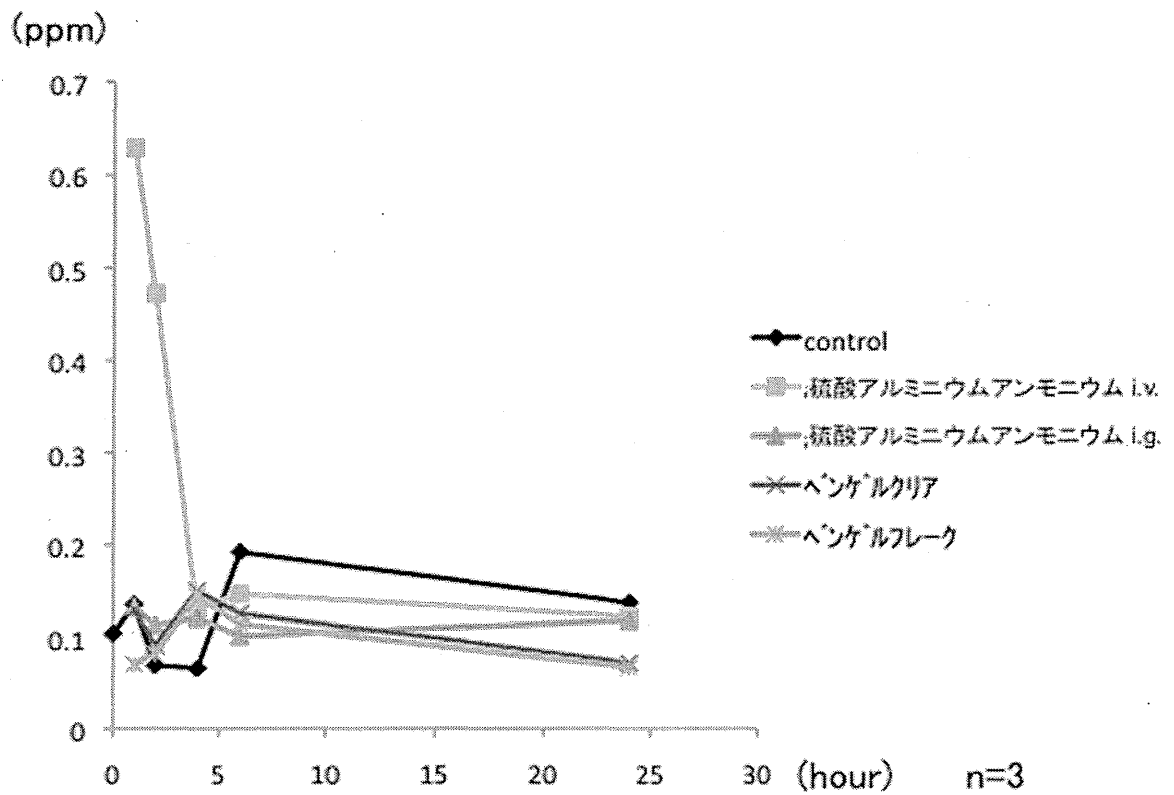


Fig. 6 Sequential data of the blood aluminum concentration in F344 rat administered aluminum or montmorillonite

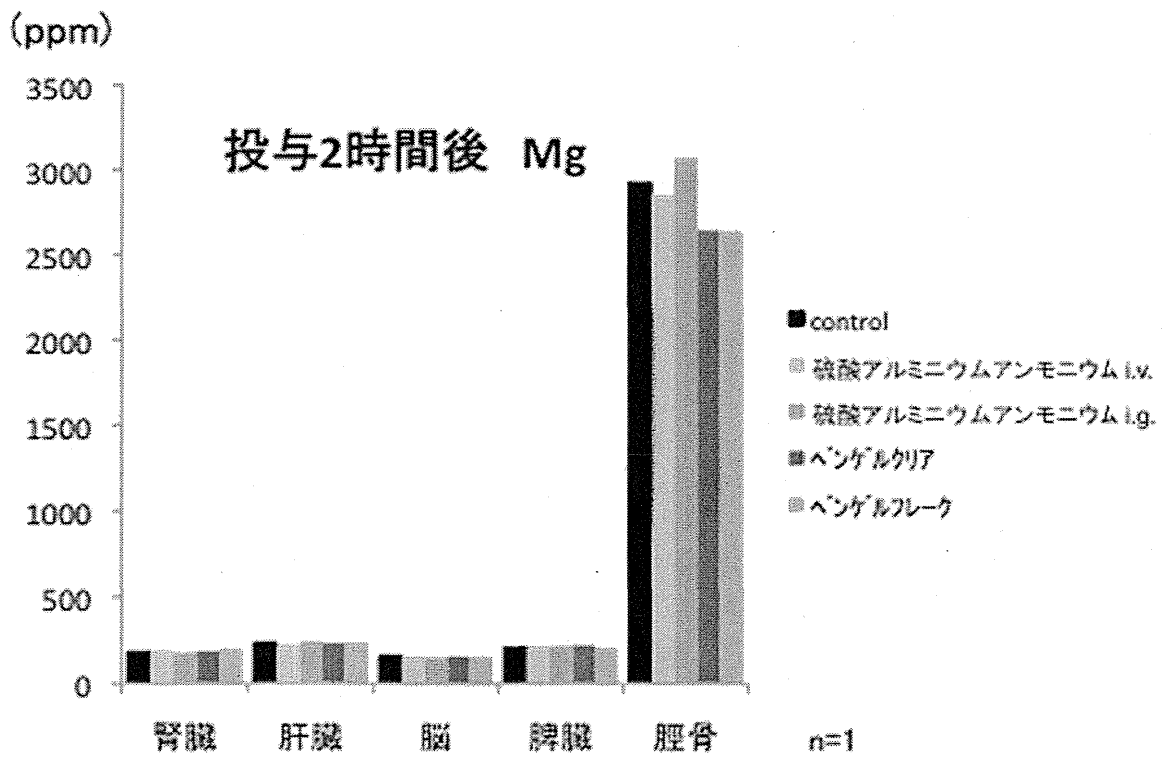
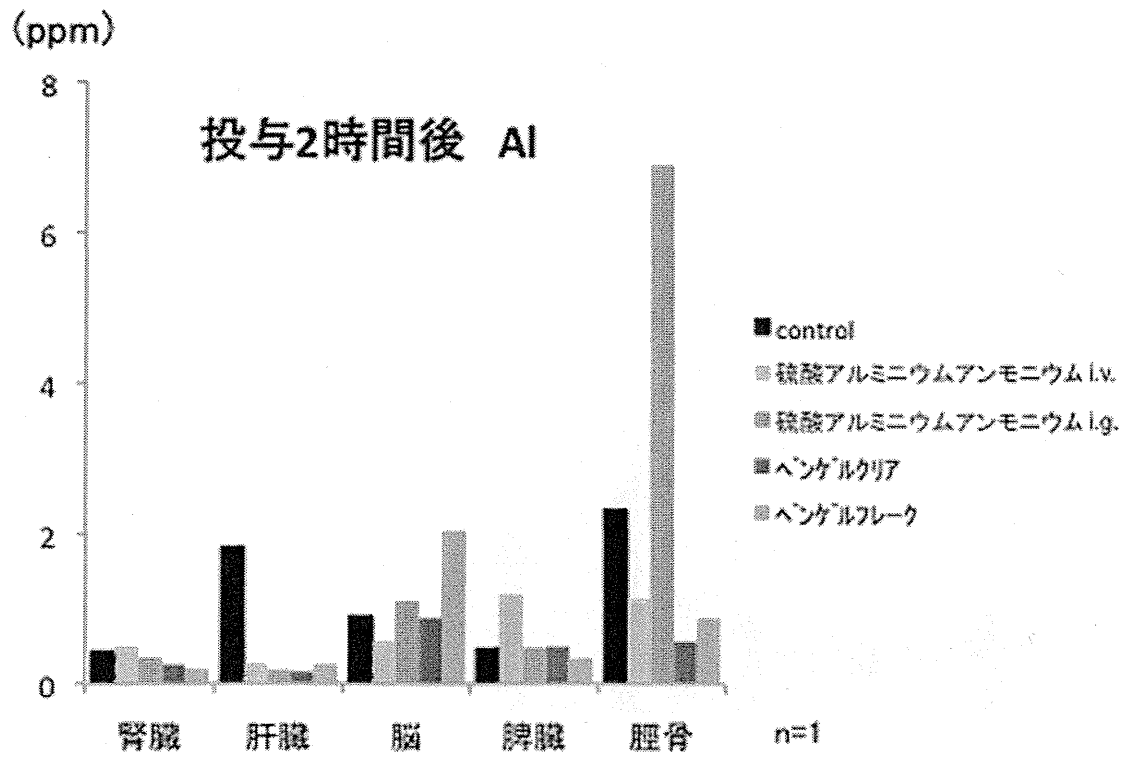


Fig. 7 Organ concentration of aluminum and magnesium in F344 rat administered aluminum or montmorillonite (2 hours after administration)

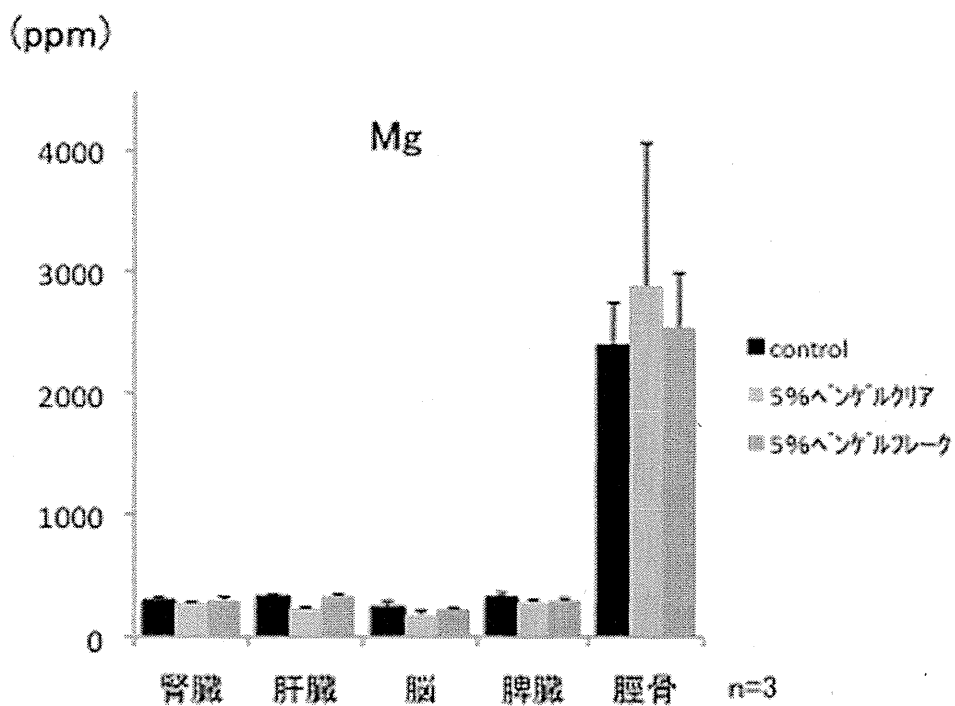
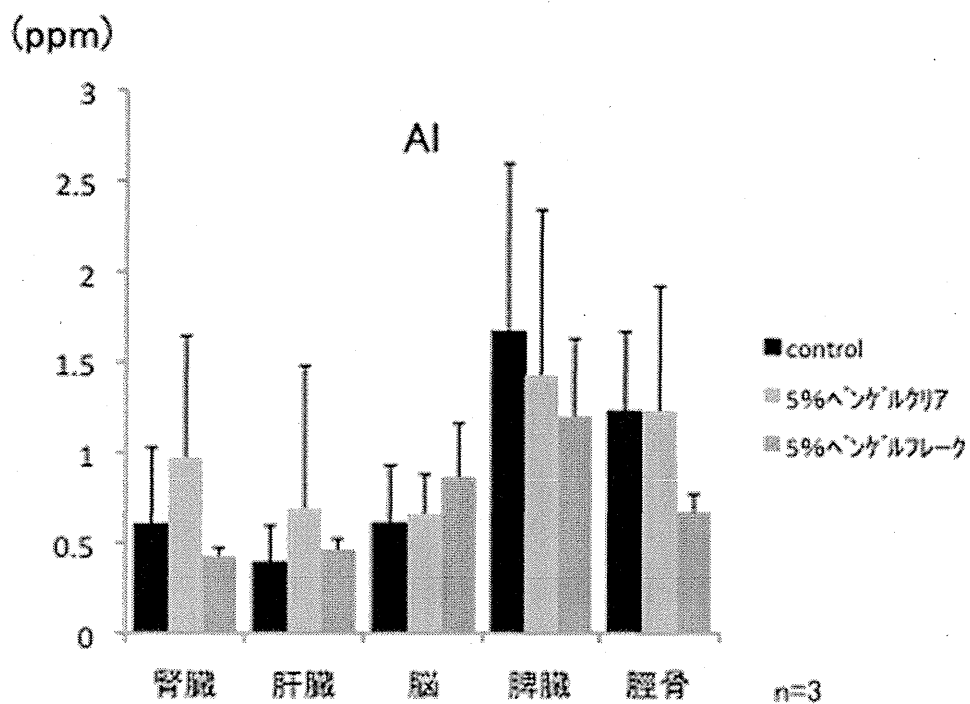


Fig. 8 Organ concentration of aluminum and magnesium in F344 rat administered montmorillonite (4 weeks after administration)

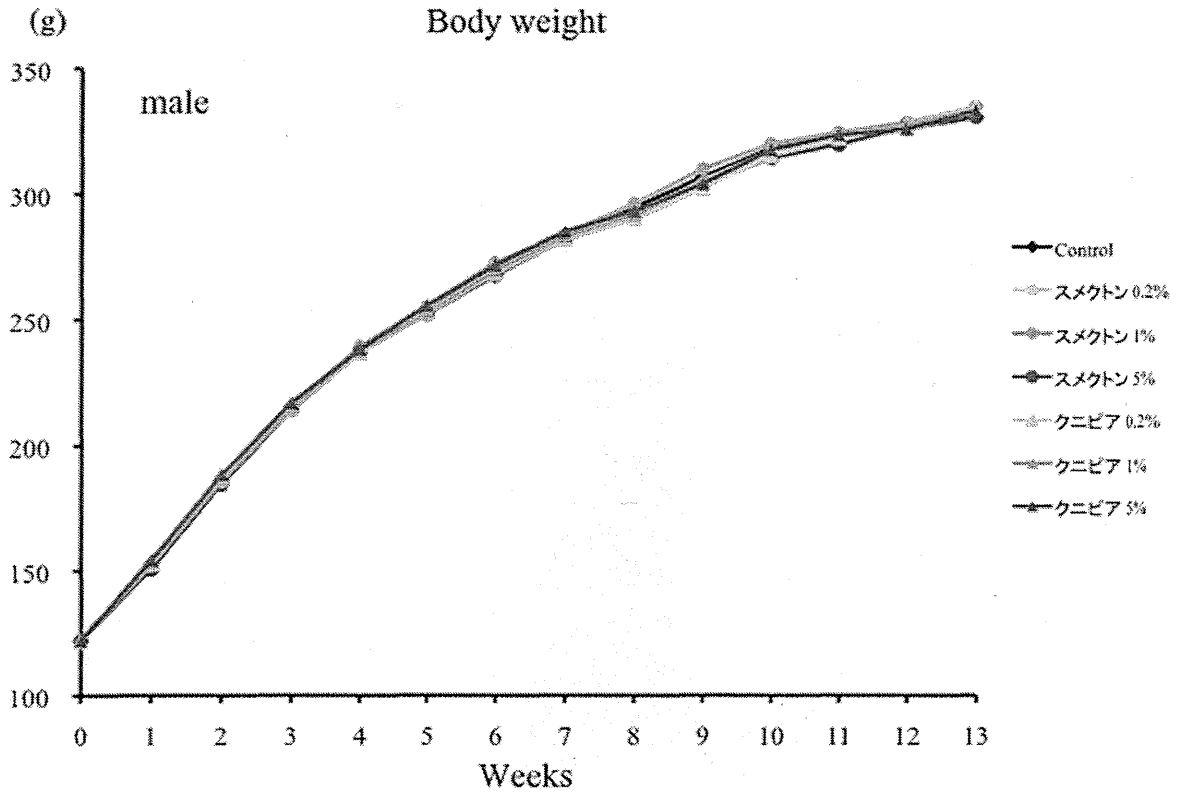


Figure 9: Mean body weights of the male F344 rats fed Sumecton or Kunipia for 13 weeks.

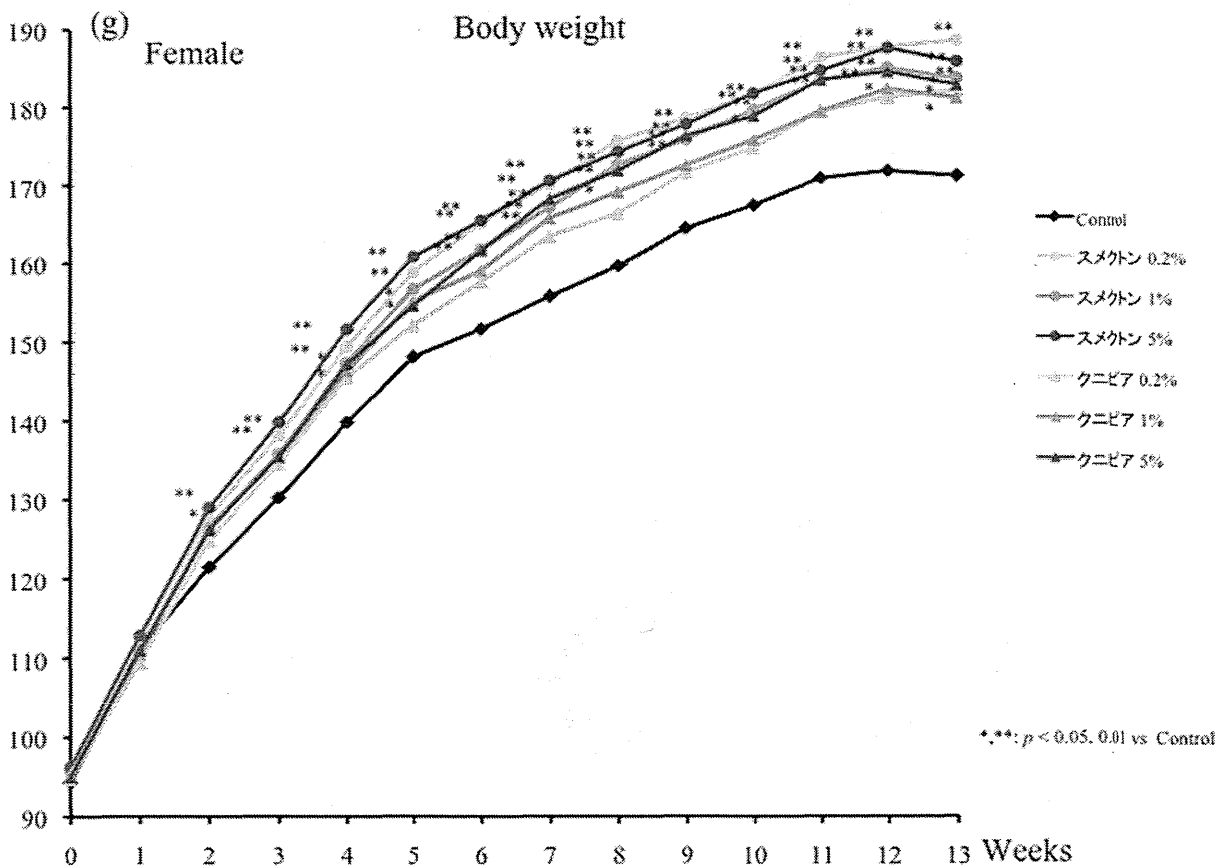


Figure 10: Mean body weights of the female F344 rat fed Sumecton or Kunipia for 13 weeks.

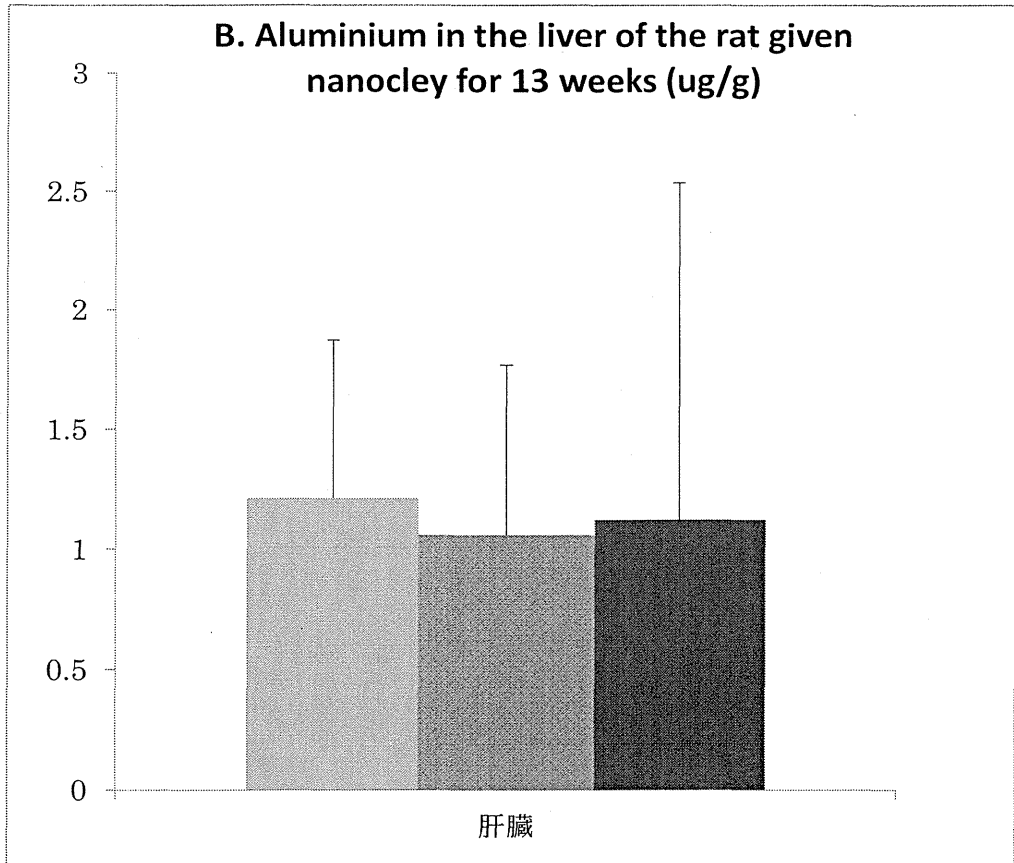
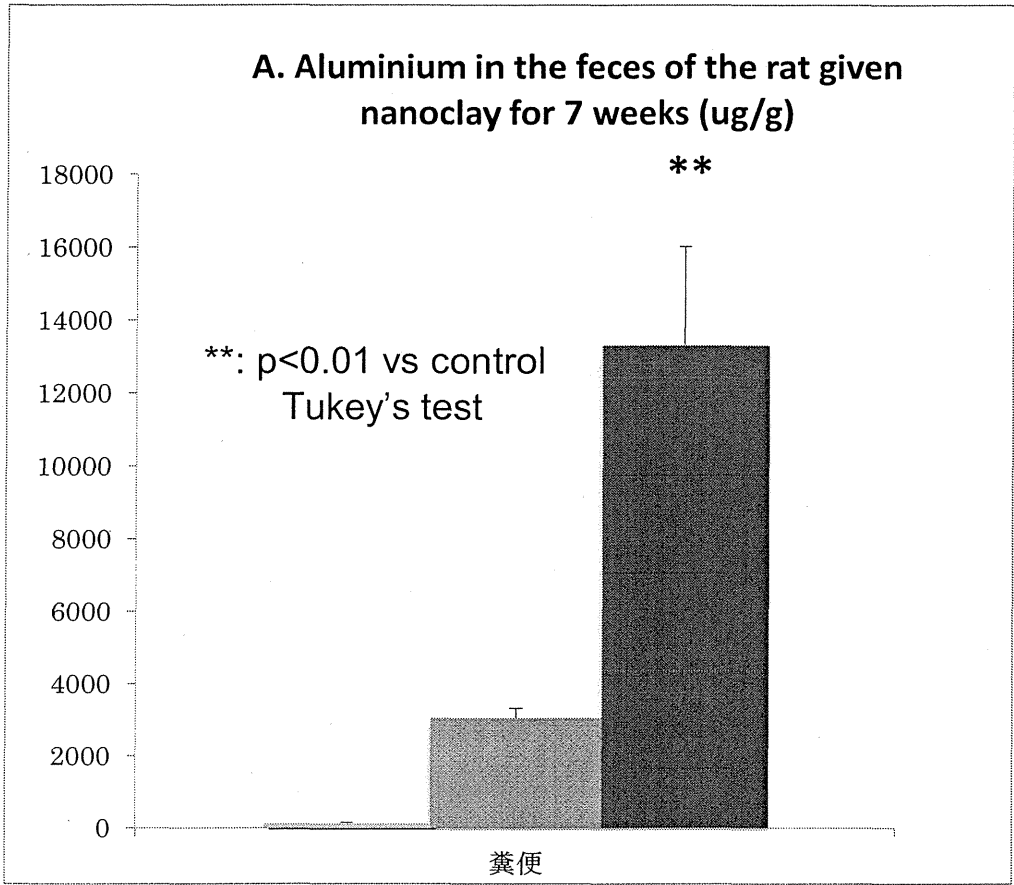
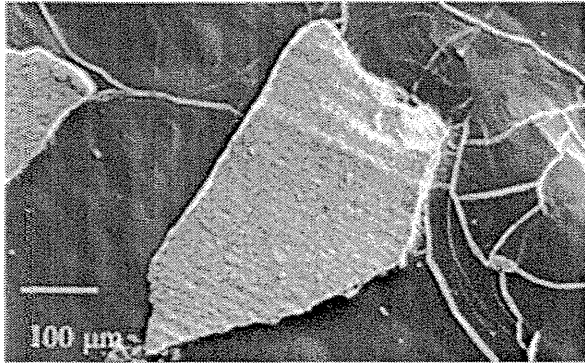


Figure 11; The aluminium concentration in the feces and liver of F344 rats fed Sumecton or Kunipia for 13 weeks.

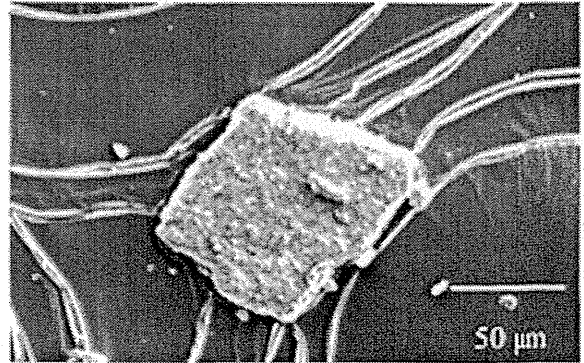
(1) ベンゲルフレーク

数100 μm の板状(A)。

押し潰しても数10 μm 程度で細粒にならない(B)。



A. ベンゲルフレークの二次電子像
加速電圧 3 kV、観察倍率 180倍

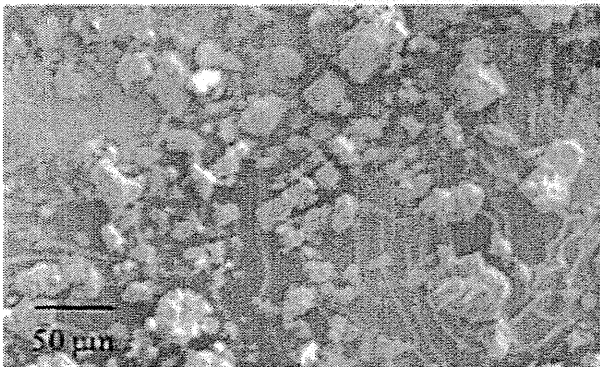


B. ベンゲルフレークの二次電子像
加速電圧 3 kV、観察倍率 600倍

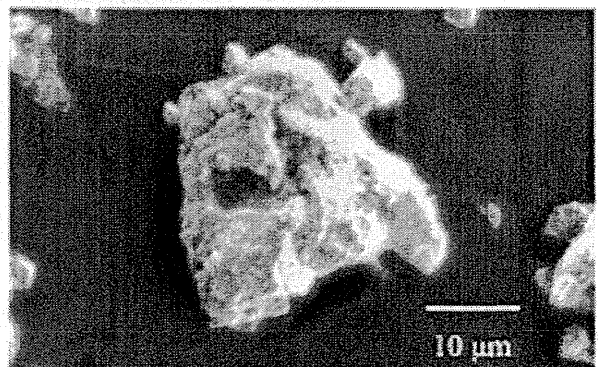
(2) ベンゲルクリア

サラサラで5~30 μm の粒子(C)。

粒子は押し潰すとどんどん細粒になる(D)。



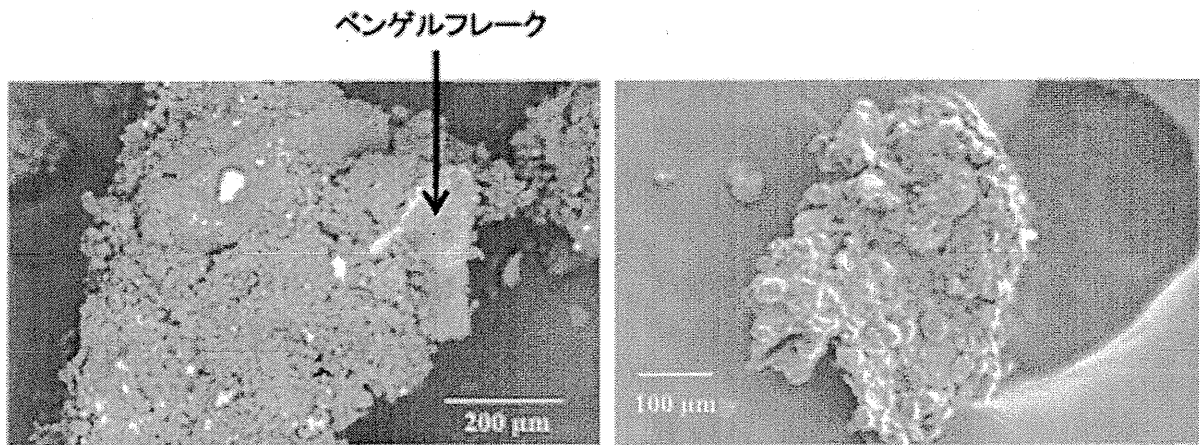
C. ベンゲルクリアの二次電子像
加速電圧 3 kV、観察倍率 400倍



D. ベンゲルクリアの二次電子像
加速電圧 3 kV、観察倍率 2000倍

Fig. 12 Scanning electronmicroscopic appearance of Bengel-flake and Bengel-clea

(3) ベンゲルフレーク混合飼料



C. ベンゲルフレーク混合飼料の反射電子像
加速電圧 20 kV、観察倍率 100倍

D. ベンゲルフレーク混合飼料二次電子像
加速電圧 3 kV、観察倍率 150倍

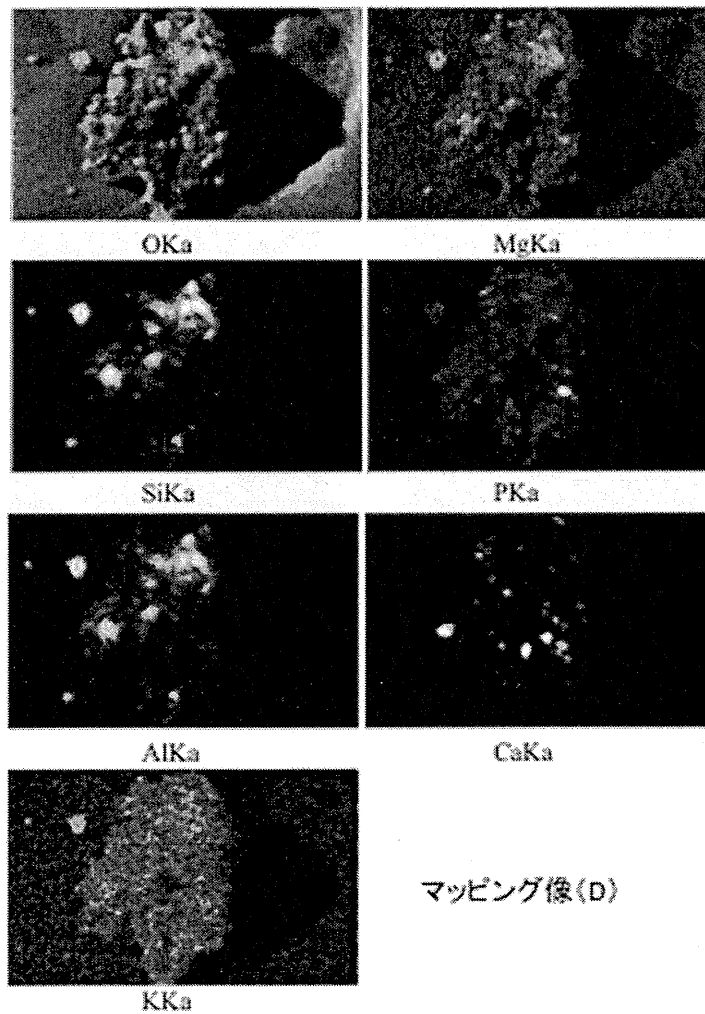
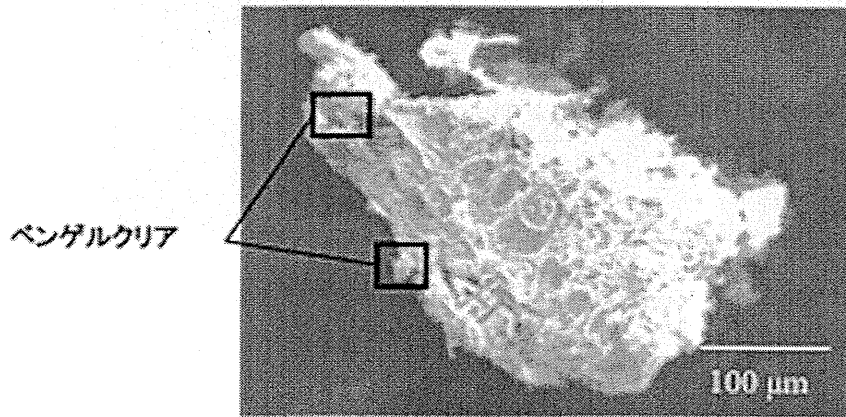
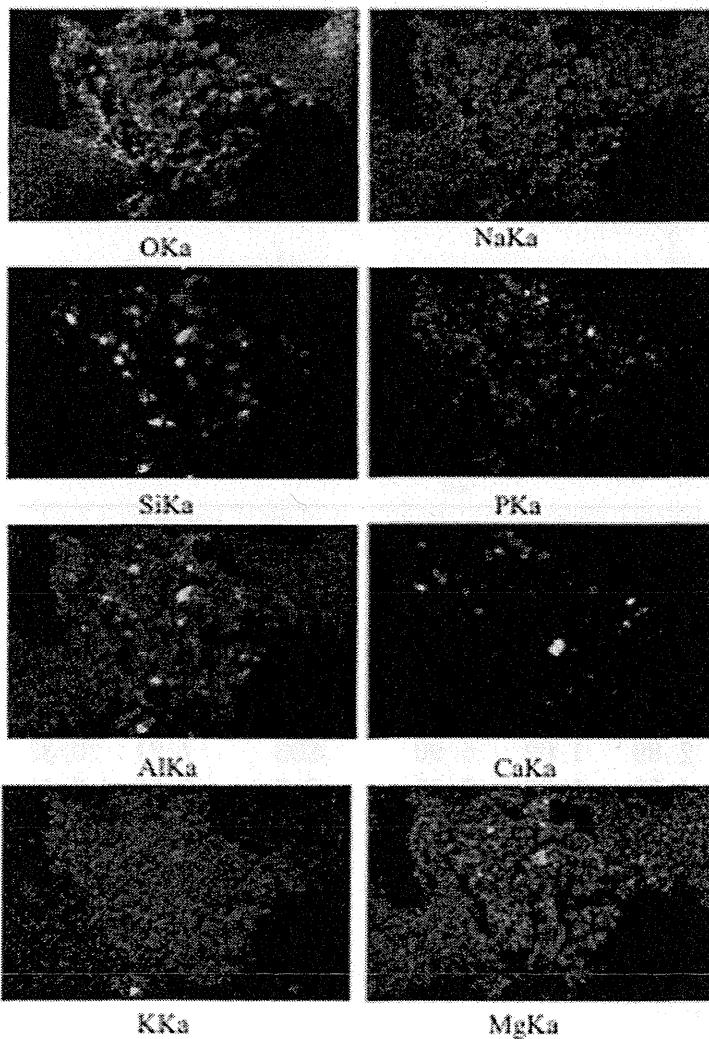


Fig. 13 Scanning electronmicroscopic appearance of bengel flake containing diet

(4)ベンゲルクリア混合飼料

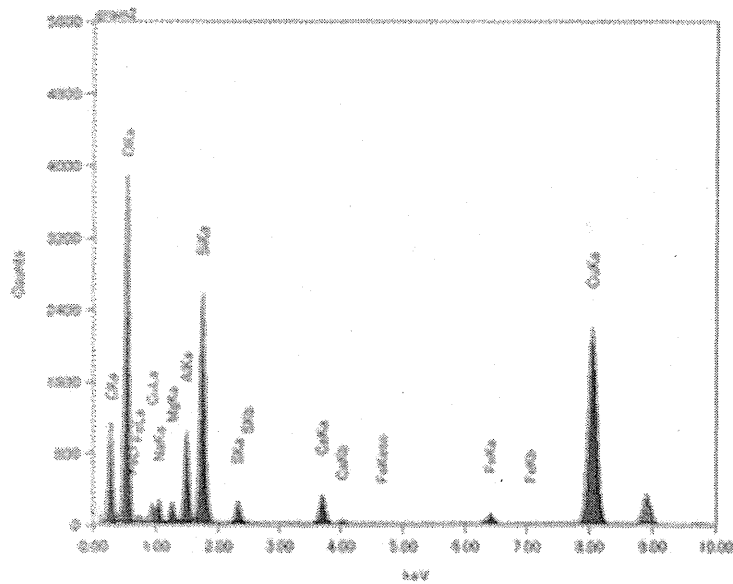
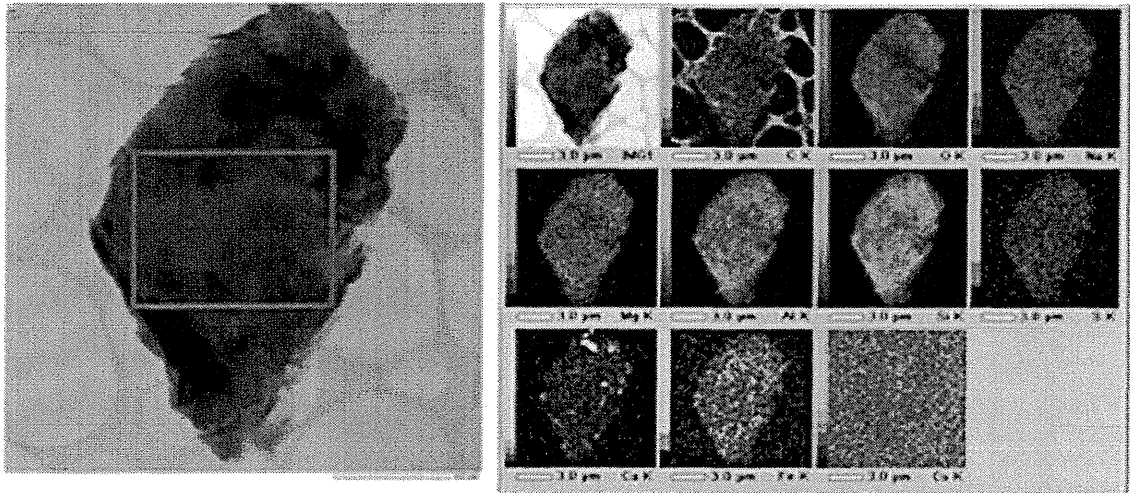


E. ベンゲルクリア混合飼料の二次電子像
加速電圧 3 kV、観察倍率 200倍



マッピング像(図E)

Fig. 14 Scanning electronmicroscopic appearance of bengel clear containing diet



元素	(keV)	カウント	質量%	誤差%	モル%	化合物	質量%	カチオン数	K
O			48.51						
Na	K 1.041	2233.41	2.80	0.60	3.99	Na ₂ O	3.77	0.44	1.1785
Mg	K 1.253	1892.55	2.15	0.69	5.79	MgO	3.56	0.32	1.0660
Al	K 1.486	9469.51	10.53	0.86	12.79	Al ₂ O ₃	19.89	1.42	1.0452
Si	K 1.739	24735.38	26.31	1.01	61.43	SiO ₂	56.28	3.40	1.0000
S	K 2.307	2412.50	2.89	1.02	5.90	SO ₃	7.21	0.33	1.1251
Ca	K 3.690	3763.11	4.52	0.78	7.39	CaO	6.32	0.41	1.1288
Fe	K 6.398	1453.04	2.30	0.91	2.70	FeO	2.96	0.15	1.4900
合計			100.00		100.00		100.00	6.46	

Fig. 15 クニピア原体の透過電顕 STEM モードによる観察
化学組成はSi>Al>>Mgであった。

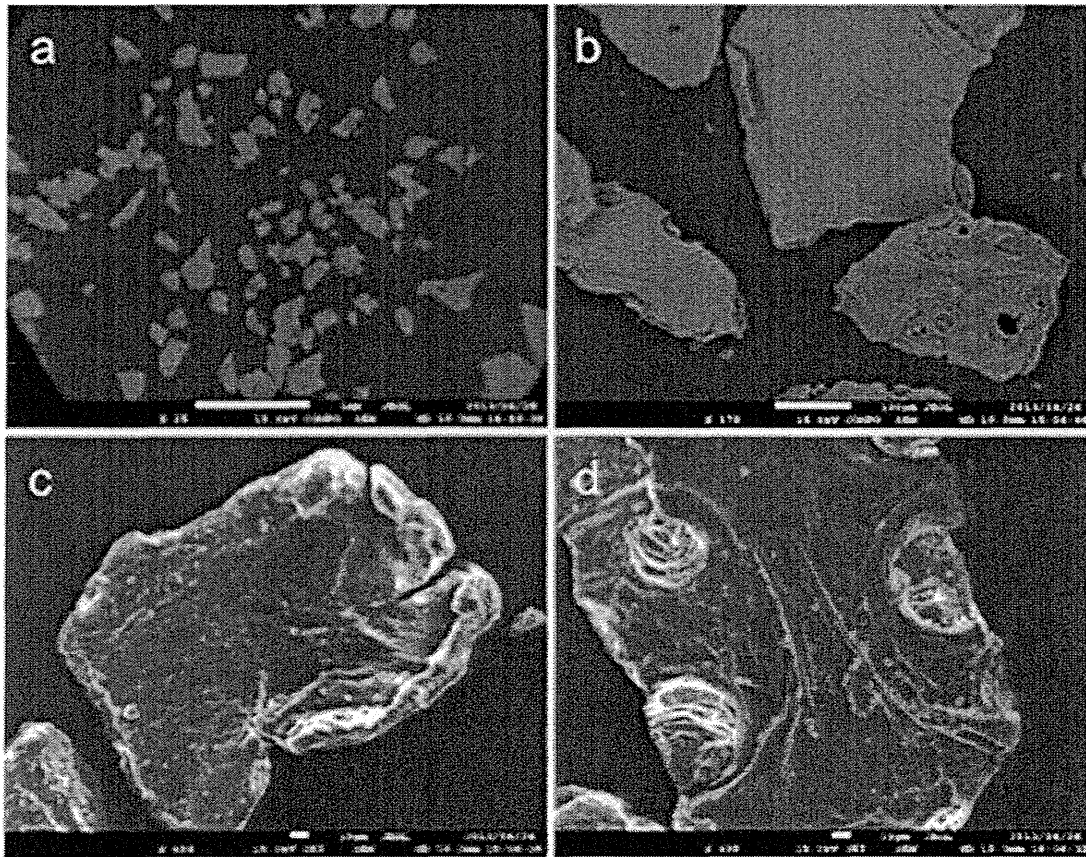


Fig. 16 クニピア原体の走査電顕像

a,b : 反射電子 (BSE) 像、c,d : 2次電子 (SE) 像

平べったく板状のものと穴が多数空いているものの二種類が見られる。板状のものは表面にあまり起伏がなくのっぺりとしており、縁が大きくめくれあがっているものも多く、穴の開いているものは表面に樹皮上の筋が見られる。穴の周囲にはCaとSの濃集が見られる。

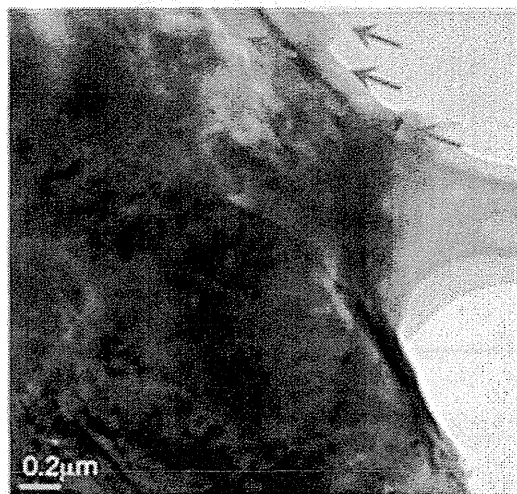


Fig. 17 クニピア原体の透過電顕 SA イメージ

粒子の端は、薄い結晶がめくれ、筋状にみえ(矢印)、約 1nm を単位とし数層重なっている。

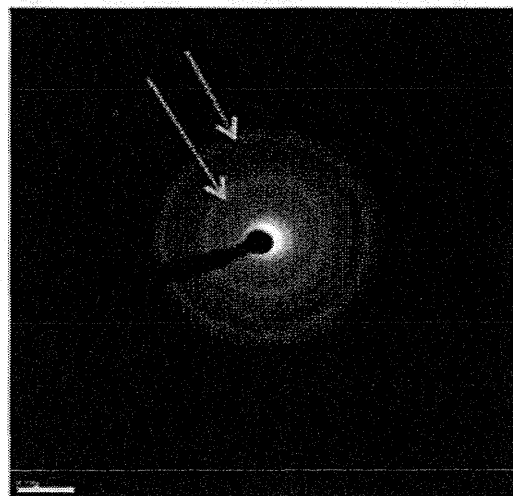
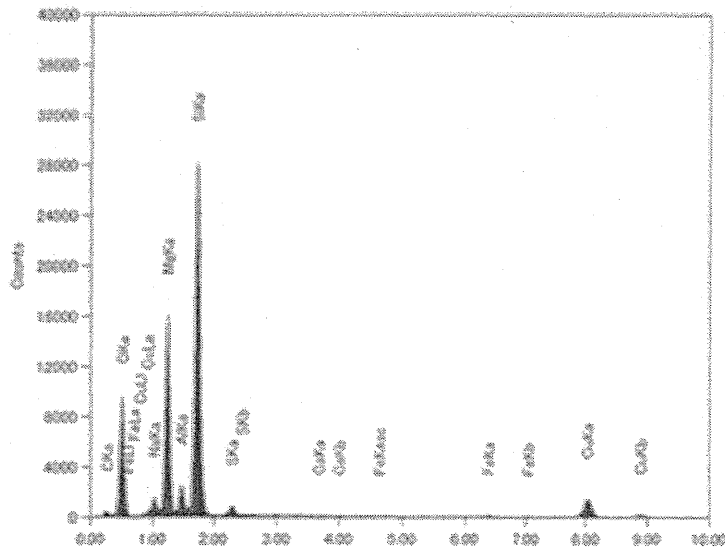
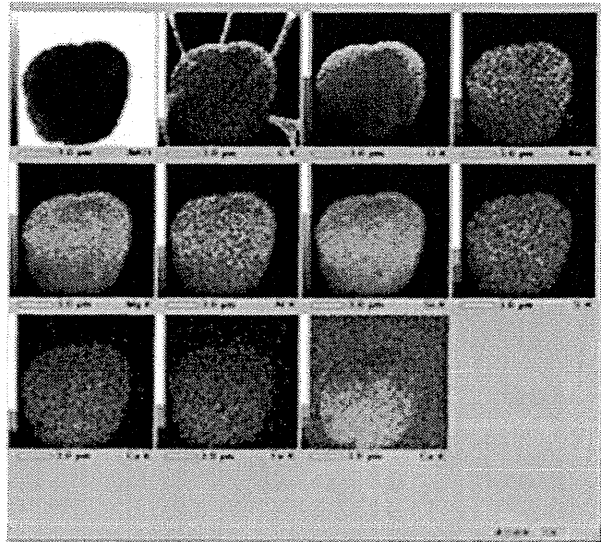
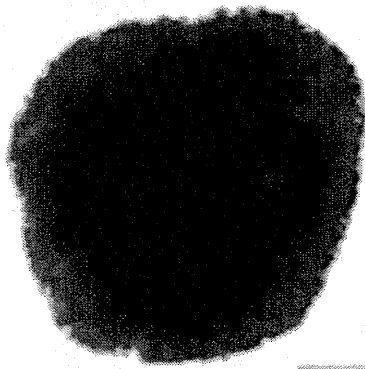


Fig. 18 クニピア原体の制限視野電子回折パターン

層状のモンモリロナイトが不規則に重なることにより、リング状(矢印)に見える。

5.



元素	(keV)	カウント	質量%	誤差%	モル%	化合物	質量%	カチオン数	K
O			48.71						
Na	K 1.041	13424.86	1.74	0.25	2.05	Na ₂ O	2.35	0.27	1.1785
Mg	K 1.253	140348.86	16.48	0.29	36.72	MgO	27.32	2.45	1.0660
Al	K 1.486	21233.46	2.44	0.36	2.45	Al ₂ O ₃	4.62	0.33	1.0452
Si	K 1.739	269115.28	29.63	0.43	57.18	SiO ₂	63.40	3.81	1.0000
S	K 2.307	6965.00	0.86	0.43	1.46	SO ₃	2.15	0.10	1.1251
Ca	K 3.690	122.06	0.02	0.33	0.02	CaO	0.02	0.00	1.1288
Fe	K 6.398	692.95	0.11	0.38	0.11	FeO	0.15	0.01	1.4900
合計			100.00		100.00		100.00		6.97

Fig. 19 スメクトン原体の透過電顕 STEM モードによる観察
化学組成はSi>Mg>>Alであった。

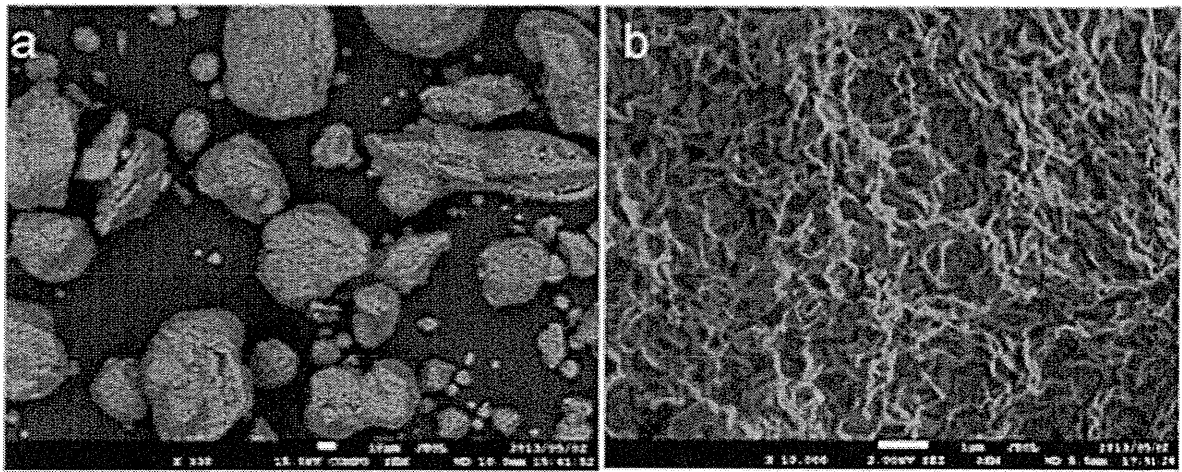


Fig. 20 スメクトン原体の走査電顕像

a: 反射電子 (BSE) 像、b: 2次電子 (SE) 像

ほとんどのものが球状を示し、表面には微細な起伏が見られる。拡大するとスポンジ状の構造を取っている。

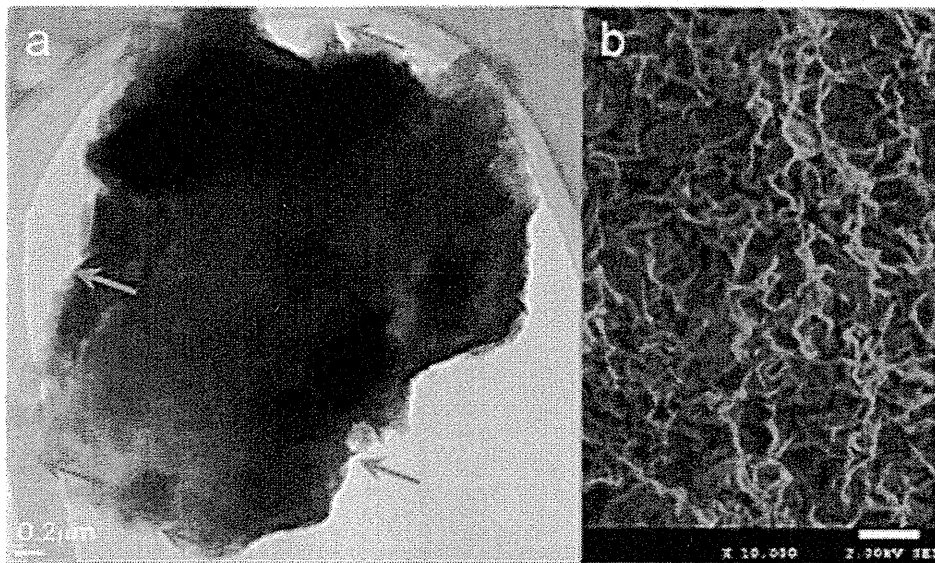


Fig. 21 スメクトン原体の透過電顕 SA イメージ(a) および走査電顕像 (b). 辺縁部に厚さを示す薄い黒い線がみえ (矢印)、走査電顕では、厚さに対応するしわが確認される。

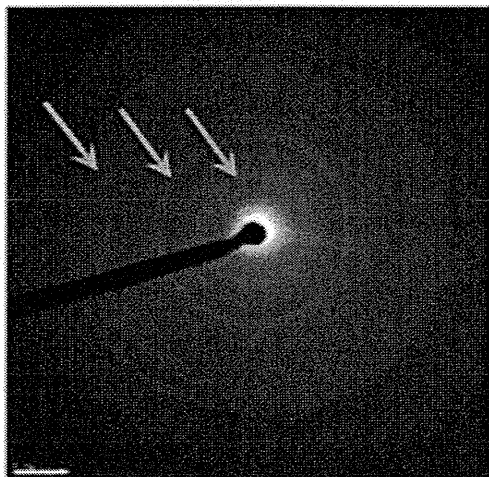


Fig. 22 スメクトン原体の制限視野電子回折パターン

折りたたまれたしわ状のサポナイトにより、リング状 (矢印) に見える。

Table 1 Food consumption and material intake of F344 rats fed diet containing Bengel-clea or Bengel-flake for 4 weeks

Sex	Dose (%)	No. of animals examined	Food consumption						Intake of Clea or Flake	
			(g/rat/day)			(g/kg BW/day)			Daily (g/kg BW/day)	Total (g/kg BW)
male										
Control	0	5	14.7	±	1.0	76.5	±	8.6	0	0
Clea	0.2	5	14.7	±	1.4	76.0	±	6.2	0.15	4
	1	5	14.7	±	1.0	75.2	±	8.9	0.75	21
Flake	5	5	15.3	±	1.1	78.1	±	8.2	3.91	109
	0.2	5	14.4	±	1.0	73.6	±	8.1	0.15	4
	1	5	15.1	±	1.5	76.7	±	6.9	0.77	21
	5	5	15.8	±	1.8	80.3	±	7.6	4.01	112
female										
Control	0	5	10.0	±	0.1	74.6	±	6.5	0	0
Clea	0.2	5	10.1	±	0.3	73.7	±	6.0	0.15	4
	1	5	10.3	±	0.3	75.8	±	5.5	0.76	21
Flake	5	5	10.8	±	0.3	79.3	±	6.4	3.96	111
	0.2	5	9.9	±	0.3	73.6	±	5.3	0.15	4
	1	5	10.3	±	0.4	75.4	±	6.0	0.75	21
	5	5	10.9	±	0.2	79.4	±	7.2	3.97	111

Table 2. Organ weight of male F344 rats fed diet containing Bengel-clea or Bengel-flake for 4 weeks

Treatment	Control		Bengel-clea				Bengel-flake							
			0.20%		1%		5%		0.20%		1%		5%	
No. of animals	5		5		5		5		5		5		5	
Body weight (g)	219.14	± 8.66	220.78	± 7.88	222.58	± 4.79	220.06	± 5.24	216.92	± 6.00	224.26	± 6.05	222.38	± 6.80
Absolute														
Brain(g)	1.85	± 0.02	1.81	± 0.02	1.84	± 0.06	1.86	± 0.04	1.85	± 0.05	1.85	± 0.06	1.86	± 0.04
Thymus(g)	0.31	± 0.02	0.28	± 0.02	0.29	± 0.05	0.31	± 0.06	0.32	± 0.05	0.31	± 0.02	0.29	± 0.02
Heart(g)	0.76	± 0.07	0.75	± 0.04	0.75	± 0.05	0.76	± 0.04	0.75	± 0.06	0.76	± 0.05	0.74	± 0.03
Spleen(g)	0.50	± 0.03	0.51	± 0.01	0.53	± 0.02	0.52	± 0.03	0.51	± 0.03	0.52	± 0.02	0.52	± 0.04
Liver(g)	6.55	± 0.40	6.56	± 0.22	6.35	± 0.12	6.19	± 0.14	6.05	± 0.15	6.22	± 0.22	6.05	± 0.22 *
Adrenal(g)	0.03	± 0.006	0.03	± 0.005	0.03	± 0.003	0.04	± 0.003	0.04	± 0.003	0.03	± 0.004	0.03	± 0.003
Kidneys(g)	1.51	± 0.05	1.55	± 0.06	1.54	± 0.06	1.56	± 0.04	1.54	± 0.05	1.60	± 0.08	1.58	± 0.09
Gonad(g)	2.66	± 0.05	2.72	± 0.08	2.77	± 0.06	2.74	± 0.07	2.75	± 0.08	2.77	± 0.06	2.70	± 0.11
Relative														
Brain(%)	0.85	± 0.04	0.82	± 0.03	0.83	± 0.03	0.85	± 0.02	0.85	± 0.04	0.82	± 0.04	0.84	± 0.02
Thymus(%)	0.14	± 0.01	0.13	± 0.01	0.13	± 0.02	0.14	± 0.03	0.15	± 0.02	0.14	± 0.01	0.13	± 0.01
Heart(%)	0.35	± 0.03	0.34	± 0.01	0.34	± 0.02	0.35	± 0.02	0.35	± 0.03	0.34	± 0.02	0.33	± 0.01
Spleen(%)	0.23	± 0.01	0.23	± 0.01	0.24	± 0.01	0.24	± 0.01	0.23	± 0.02	0.23	± 0.01	0.23	± 0.01
Liver(%)	2.99	± 0.09	2.97	± 0.06	2.85	± 0.03 **	2.81	± 0.05 **	2.79	± 0.05 **	2.77	± 0.06 **	2.72	± 0.06 **
Adrenal(%)	0.02	± 0.003	0.02	± 0.002	0.02	± 0.002	0.02	± 0.002	0.02	± 0.001	0.02	± 0.002	0.02	± 0.001
Kidneys(%)	0.69	± 0.03	0.70	± 0.02	0.69	± 0.03	0.71	± 0.02	0.71	± 0.03	0.71	± 0.03	0.71	± 0.03
Gonad(%)	1.21	± 0.07	1.23	± 0.03	1.24	± 0.01	1.25	± 0.04	1.27	± 0.03	1.23	± 0.03	1.21	± 0.03

Each value represents the mean ± S.D.

*, **; Significantly different from the control at p<0.05 and p<0.01, respectively

#; n=4

Table 3. Organ weight of female F344 rats fed diet containing Bengel-clea or Bengel-flake for 4 weeks

Treatment	Control		Bengel-clea				Bengel-flake							
			0.20%		1%		5%		0.20%		1%		5%	
No. of animals	5		5		5		5		5		5		5	
Body weight (g)	143.86	± 5.59	149.82	± 2.90	145.94	± 5.08	145.56	± 4.65	143.24	± 5.22	146.20	± 3.88	145.88	± 4.89
Absolute														
Brain(g)	1.74	± 0.05	1.77	± 0.04	1.74	± 0.05	1.71	± 0.08	1.71	± 0.10	1.78	± 0.02	1.76	± 0.02
Thymus(g)	0.25	± 0.02	0.26	± 0.03	0.24	± 0.02	0.26	± 0.02	0.26	± 0.02	0.25	± 0.03	0.24	± 0.03
Heart(g)	0.51	± 0.02	0.53	± 0.03	0.53	± 0.03	0.53	± 0.02	0.52	± 0.03	0.53	± 0.02	0.55	± 0.03
Spleen(g)	0.36	± 0.01	0.39	± 0.02	0.36	± 0.04	0.38	± 0.03	0.37	± 0.02	0.38	± 0.02	0.38	± 0.03
Liver(g)	3.89	± 0.19	3.91	± 0.23	3.85	± 0.19	3.80	± 0.14	3.79	± 0.07	3.87	± 0.11	3.72	± 0.22
Adrenal(g)	0.04	± 0.004	0.04	± 0.005	0.04	± 0.004	0.04	± 0.004	0.04	± 0.004	0.05	± 0.005	0.04	± 0.003
Kidneys(g)	1.03	± 0.04	1.09	± 0.04	1.04	± 0.06	1.06	± 0.02	1.07	± 0.01	1.07	± 0.04	1.05	± 0.05
Gonad(g)	0.07	± 0.01	0.07	± 0.02	0.07	± 0.01	0.07	± 0.01	0.07	± 0.01	0.07	± 0.01	0.07	± 0.01
Relative														
Brain(%)	1.21	± 0.07	1.18	± 0.01	1.19	± 0.04	1.17	± 0.04	1.20	± 0.09	1.22	± 0.04	1.21	± 0.04
Thymus(%)	0.17	± 0.01	0.17	± 0.02	0.16	± 0.02	0.18	± 0.01	0.18	± 0.01	0.17	± 0.02	0.17	± 0.02
Heart(%)	0.35	± 0.01	0.36	± 0.02	0.36	± 0.02	0.37	± 0.02	0.36	± 0.01	0.37	± 0.02	0.38	± 0.01 **
Spleen(%)	0.25	± 0.01	0.26	± 0.01	0.25	± 0.02	0.26	± 0.01	0.26	± 0.01	0.26	± 0.01	0.26	± 0.01
Liver(%)	2.71	± 0.10	2.61	± 0.10	2.64	± 0.04	2.61	± 0.05	2.65	± 0.12	2.65	± 0.07	2.55	± 0.11
Adrenal(%)	0.03	± 0.002	0.03	± 0.003	0.02	± 0.002	0.03	± 0.003	0.03	± 0.003	0.03	± 0.004	0.03	± 0.001
Kidneys(%)	0.72	± 0.05	0.73	± 0.02	0.71	± 0.02	0.73	± 0.01	0.75	± 0.03	0.73	± 0.02	0.72	± 0.02
Gonad(%)	0.05	± 0.01	0.04	± 0.01	0.05	± 0.01	0.05	± 0.00	0.05	± 0.01	0.05	± 0.01	0.05	± 0.00

Each value represents the mean ± S.D.

*, **; Significantly different from the control at p<0.05 and p<0.01, respectively

Table 4. Food consumption and material intake of F344 rats fed diet containing Bengel-clea or Bengel-flake for 13 weeks

Sex	Dose (%)	No. of animals examined	Food consumption			Intake of clea or flake		
			(g/rat/day)	(g/kg BW/day)	Daily (g/kg BW/day)	Total (g/kg BW)		
male								
control	0	10	14.8 ± 0.8	64.0 ± 23.8	0	0		
clea	0.04	10	14.5 ± 0.7	61.9 ± 21.5	0.02	2		
	0.2	10	14.8 ± 0.8	64.6 ± 21.9	0.13	12		
	1	10	15.1 ± 0.8	65.2 ± 22.6	0.65	59		
	5	10	16.0 ± 0.7	67.0 ± 23.7	3.35	301		
	0.04	10	14.8 ± 0.8	62.5 ± 22.0	0.03	2		
flake	0.2	10	14.8 ± 0.8	62.2 ± 21.3	0.12	11		
	1	10	15.1 ± 0.8	64.1 ± 22.5	0.64	58		
	5	10	15.8 ± 0.9	66.7 ± 23.3	3.34	300		
	female							
	control	0	10	9.9 ± 0.5	67.3 ± 17.9	0	0	
clea	0.04	10	9.7 ± 0.6	66.9 ± 17.9	0.03	2		
	0.2	10	9.9 ± 0.6	67.6 ± 18.5	0.14	12		
	1	10	9.7 ± 0.6	67.3 ± 18.2	0.67	61		
	5	10	10.6 ± 0.5	70.7 ± 19.1	3.53	318		
	0.04	10	9.5 ± 0.7	64.8 ± 17.4	0.03	2		
flake	0.2	10	9.4 ± 0.8	64.0 ± 17.8	0.13	12		
	1	10	9.7 ± 0.7	66.4 ± 18.2	0.66	60		
	5	10	10.2 ± 0.8	69.2 ± 19.4	3.46	311		

Table 5. Organ weight of F344 rats fed diet containing Bengel-clea or Bengel-flake for 13 weeks : male

Treatment	Control	Bengel-clea				Bengel-flake			
		0.04%	0.2%	1%	5%	0.04%	0.2%	1%	5%
No. of animals	10	10	10	10	10	10	10	10	10
Body weight (g)	315 ± 18.8	325 ± 20.8	328 ± 12.2	333 ± 11.6	333 ± 10.1	333 ± 15.3	332 ± 11.7	329 ± 11.5	328 ± 10.4
Absolute									
Brain (g)	2.06 ± 0.04	1.99 ± 0.06	1.98 ± 0.05	1.98 ± 0.03	2.01 ± 0.05	1.99 ± 0.03	2.00 ± 0.04	2.00 ± 0.03	1.97 ± 0.07
Thymus (g)	0.21 ± 0.05	0.22 ± 0.02	0.22 ± 0.03	0.22 ± 0.02	0.22 ± 0.04	0.22 ± 0.03	0.23 ± 0.02	0.21 ± 0.02	0.20 ± 0.01
Lungs (g)	0.96 ± 0.11	0.94 ± 0.14	0.95 ± 0.09	0.99 ± 0.09	1.02 ± 0.07	0.93 ± 0.07	0.97 ± 0.10	0.97 ± 0.10	1.04 ± 0.10
Heart (g)	0.93 ± 0.07	0.94 ± 0.08	0.95 ± 0.03	0.95 ± 0.06	0.94 ± 0.04	0.96 ± 0.03	0.95 ± 0.05	0.96 ± 0.04	0.96 ± 0.08
Spleen (g)	0.80 ± 0.04	0.83 ± 0.05	0.82 ± 0.04	0.85 ± 0.08 *	0.84 ± 0.04	0.85 ± 0.03	0.83 ± 0.03	0.83 ± 0.04	0.84 ± 0.02
Liver (g)	7.71 ± 0.47	7.80 ± 0.41	7.88 ± 0.39	7.96 ± 0.44	7.90 ± 0.32	8.07 ± 0.50	7.96 ± 0.38	7.88 ± 0.43	8.09 ± 0.31
Adrenals (g)	0.04 ± 0.00	0.04 ± 0.00	0.04 ± 0.00	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.00	0.04 ± 0.01	0.04 ± 0.00	0.04 ± 0.00
Kidneys (g)	1.90 ± 0.10	1.90 ± 0.11	1.91 ± 0.05	1.93 ± 0.09	2.02 ± 0.15	1.95 ± 0.10	1.98 ± 0.08	2.02 ± 0.10 *	1.98 ± 0.08
Gnads (g)	3.12 ± 0.14	3.03 ± 0.16	3.09 ± 0.12	3.11 ± 0.14	3.15 ± 0.09	3.07 ± 0.12	3.08 ± 0.08	3.12 ± 0.12	3.07 ± 0.10
Relative									
Brain (g%)	0.63 ± 0.03	0.61 ± 0.03	0.61 ± 0.03	0.60 ± 0.02	0.60 ± 0.02	0.60 ± 0.03	0.60 ± 0.03	0.61 ± 0.02	0.60 ± 0.02
Thymus (g%)	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	0.06 ± 0.01	0.07 ± 0.01	0.06 ± 0.00	0.06 ± 0.00
Lungs (g%)	0.30 ± 0.04	0.29 ± 0.04	0.29 ± 0.02	0.30 ± 0.03	0.31 ± 0.02	0.28 ± 0.01	0.29 ± 0.03	0.30 ± 0.03	0.32 ± 0.04
Heart (g%)	0.29 ± 0.01	0.29 ± 0.01	0.29 ± 0.01	0.28 ± 0.02	0.28 ± 0.01	0.29 ± 0.01	0.29 ± 0.02	0.29 ± 0.01	0.29 ± 0.02
Spleen (g%)	0.16 ± 0.01	0.19 ± 0.01	0.19 ± 0.01	0.20 ± 0.03	0.19 ± 0.01	0.19 ± 0.01	0.19 ± 0.01	0.19 ± 0.01	0.19 ± 0.01
Liver (g%)	2.42 ± 0.06	2.39 ± 0.05	2.39 ± 0.07	2.39 ± 0.06	2.37 ± 0.04	2.42 ± 0.07	2.40 ± 0.06	2.40 ± 0.11	2.46 ± 0.04
Adrenals (g%)	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00
Kidneys (g%)	0.60 ± 0.02	0.58 ± 0.02	0.58 ± 0.01	0.58 ± 0.01	0.61 ± 0.04	0.58 ± 0.02	0.60 ± 0.02	0.62 ± 0.03	0.60 ± 0.03
Gnads (g%)	0.98 ± 0.04	0.93 ± 0.04	0.94 ± 0.06	0.93 ± 0.03	0.95 ± 0.04	0.92 ± 0.04	0.93 ± 0.04	0.95 ± 0.05	0.93 ± 0.04

Each value represents the mean ± SD.

*, **: Significantly different from control v.s. administered group at p < 0.05 and p < 0.01, respectively

Table 6. Organ weight of F344 rats fed diet containing Bengel-clea or Bengel-flake for 13 weeks : female

Treatment	Control	Bengel-clea				Bengel-flake			
		0.04%	0.2%	1%	5%	0.04%	0.2%	1%	5%
No. of animals	10	10	10	10	10	10	10	10	10
Body weight (g)	178.1 ± 4.0	176.9 ± 5.1	180.6 ± 7.3	177.4 ± 10.5	181.5 ± 5.3	177.7 ± 4.7	177.1 ± 5.5	176.8 ± 8.1	177.2 ± 7.2
Absolute									
Brain (g)	1.81 ± 0.03	1.81 ± 0.04	1.81 ± 0.05	1.78 ± 0.05	1.80 ± 0.04	1.81 ± 0.05	1.81 ± 0.04	1.82 ± 0.04	1.78 ± 0.08
Thymus (g)	0.17 ± 0.01	0.17 ± 0.01	0.16 ± 0.02	0.17 ± 0.02	0.17 ± 0.03	0.17 ± 0.02	0.16 ± 0.03	0.17 ± 0.02	0.16 ± 0.02
Lungs (g)	0.69 ± 0.05	0.66 ± 0.06	0.69 ± 0.07	0.68 ± 0.10	0.71 ± 0.07	0.66 ± 0.04	0.71 ± 0.07	0.68 ± 0.05	0.67 ± 0.08
Heart (g)	0.57 ± 0.03	0.56 ± 0.04	0.59 ± 0.03	0.58 ± 0.04	0.60 ± 0.04	0.58 ± 0.04	0.58 ± 0.04	0.58 ± 0.05	0.58 ± 0.03
Spleen (g)	0.39 ± 0.02	0.38 ± 0.02	0.40 ± 0.02	0.39 ± 0.03	0.41 ± 0.03	0.40 ± 0.02	0.39 ± 0.02	0.39 ± 0.03	0.39 ± 0.02
Liver (g)	3.95 ± 0.21	3.86 ± 0.18	4.00 ± 0.16	3.97 ± 0.23	4.04 ± 0.23	3.93 ± 0.20	3.91 ± 0.08	3.94 ± 0.26	3.94 ± 0.20
Adrenals (g)	0.04 ± 0.01	0.04 ± 0.00	0.04 ± 0.00	0.05 ± 0.01	0.04 ± 0.00	0.04 ± 0.00	0.04 ± 0.00	0.04 ± 0.00	0.04 ± 0.00
Kidneys (g)	1.16 ± 0.06	1.15 ± 0.05	1.15 ± 0.04	1.15 ± 0.08	1.14 ± 0.05	1.11 ± 0.07	1.13 ± 0.06	1.13 ± 0.07	1.13 ± 0.07
Gnads (g)	0.05 ± 0.01	0.06 ± 0.02	0.06 ± 0.01	0.05 ± 0.01	0.05 ± 0.01	0.06 ± 0.00	0.05 ± 0.00	0.05 ± 0.01	0.05 ± 0.00
Relative									
Brain (g%)	1.02 ± 0.03	1.02 ± 0.03	1.00 ± 0.05	1.00 ± 0.05	0.99 ± 0.04	1.02 ± 0.03	1.02 ± 0.02	1.03 ± 0.03	1.01 ± 0.05
Thymus (g%)	0.10 ± 0.01	0.09 ± 0.01	0.09 ± 0.01	0.10 ± 0.01	0.09 ± 0.01	0.10 ± 0.01	0.09 ± 0.01	0.10 ± 0.01	0.09 ± 0.01
Lungs (g%)	0.39 ± 0.03	0.38 ± 0.03	0.39 ± 0.05	0.38 ± 0.04	0.39 ± 0.03	0.37 ± 0.02	0.40 ± 0.03	0.39 ± 0.03	0.38 ± 0.04
Heart (g%)	0.32 ± 0.02	0.32 ± 0.02	0.33 ± 0.02	0.32 ± 0.01	0.33 ± 0.02	0.33 ± 0.02	0.33 ± 0.02	0.33 ± 0.02	0.33 ± 0.01
Spleen (g%)	0.22 ± 0.01	0.22 ± 0.01	0.22 ± 0.01	0.22 ± 0.01	0.22 ± 0.02	0.23 ± 0.01	0.22 ± 0.01	0.22 ± 0.01	0.22 ± 0.01
Liver (g%)	2.22 ± 0.10	2.18 ± 0.11	2.22 ± 0.08	2.24 ± 0.08	2.23 ± 0.14	2.21 ± 0.06	2.21 ± 0.08	2.22 ± 0.08	2.22 ± 0.08
Adrenals (g%)	0.02 ± 0.00	0.02 ± 0.00	0.02 ± 0.00	0.03 ± 0.00	0.02 ± 0.00	0.02 ± 0.00	0.02 ± 0.00	0.02 ± 0.00	0.02 ± 0.00
Kidneys (g%)	0.65 ± 0.03	0.65 ± 0.03	0.64 ± 0.03	0.65 ± 0.02	0.63 ± 0.04	0.62 ± 0.03	0.64 ± 0.03	0.64 ± 0.02	0.64 ± 0.03
Gnads (g%)	0.03 ± 0.01	0.03 ± 0.01	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.01	0.03 ± 0.00

Each value represents the mean ± SD.

*, **: Significantly different from control v.s. administered group at p < 0.05 and p < 0.01, respectively

Table 7. Hematology data of male F344 rats fed diet containing Bengel-clea or Bengel-flake for 13 weeks

Treatment	Control	Bengel-clea				Bengel-flake			
		0.04%	0.20%	1%	5%	0.04%	0.20%	1%	5%
No. of animals	10	10	10	10	10	10	10	10	10
WBC (x10 ³ /μl)	41 ± 11	49 ± 9	45 ± 8	45 ± 8	59 ± 11**	49 ± 11	44 ± 7	49 ± 5	53 ± 11*
RBC (x10 ⁶ /μl)	956 ± 63	955 ± 56	928 ± 35	908 ± 104	933 ± 72	972 ± 48	973 ± 36	970 ± 45	939 ± 69
HGB (g/dL)	16.2 ± 0.9	16.4 ± 0.7	16.1 ± 0.3	15.6 ± 1.9	16.3 ± 1.6	16.5 ± 0.5	16.6 ± 0.6	17.0 ± 0.4	16.5 ± 1.1
HCT (%)	51.0 ± 2.9	50.7 ± 2.7	49.3 ± 1.8	48.3 ± 5.5	49.8 ± 3.7	51.5 ± 2.1	51.3 ± 1.9	51.4 ± 2.4	49.9 ± 3.3
MCV (fL)	53.4 ± 0.7	53.1 ± 0.4	53.1 ± 0.6	53.1 ± 0.7	53.5 ± 0.5	53.0 ± 0.6	52.8 ± 0.6	53.0 ± 0.4	53.1 ± 0.6
MCH (pg)	17.0 ± 0.6	17.2 ± 0.4	17.3 ± 0.4	17.2 ± 0.3	17.5 ± 0.5	17.0 ± 0.5	17.0 ± 0.5	17.6 ± 0.6*	17.6 ± 0.3*
MCHC (g/dL)	31.8 ± 0.7	32.4 ± 0.7	32.6 ± 0.8	32.3 ± 0.9	32.7 ± 1.0	32.2 ± 0.7	32.3 ± 0.7	33.2 ± 1.0**	33.1 ± 0.5**
PLT (x10 ⁴ /μl)	68.1 ± 17.1	75.3 ± 10.6	78.0 ± 4.8	73.0 ± 9.4	73.2 ± 10.6	76.5 ± 6.0	77.6 ± 3.3	81.9 ± 5.8**	80.5 ± 8.1*
Differential counts (%)									
Band form neutrophils	0.2 ± 0.3	0.2 ± 0.3	0.1 ± 0.2	0.1 ± 0.2	0.2 ± 0.3	0.1 ± 0.2	0.3 ± 0.4	0.2 ± 0.3	0.1 ± 0.2
Segmented neutrophils	24.9 ± 6.4	24.5 ± 3.1	28.4 ± 7.4	25.2 ± 5.0	25.8 ± 6.5	27.2 ± 6.3	26.5 ± 7.1	27.3 ± 5.7	25.4 ± 2.7
Eosinophils	1.0 ± 0.8	1.6 ± 1.2	1.4 ± 0.8	1.4 ± 0.7	0.9 ± 0.6	1.3 ± 0.8	1.3 ± 0.8	1.0 ± 1.0	1.1 ± 0.8
Basophils	0	0	0	0	0	0	0	0	0
Lymphocytes	73.5 ± 5.8	73.6 ± 2.8	69.6 ± 7.4	73.0 ± 5.1	72.5 ± 6.4	70.9 ± 6.5	71.3 ± 7.2	71.4 ± 5.4	73.2 ± 3.3
Monocytes	0.5 ± 0.7	0.2 ± 0.3	0.6 ± 0.6	0.4 ± 0.5	0.6 ± 0.6	0.6 ± 0.8	0.6 ± 0.8	0.3 ± 0.4	0.3 ± 0.5
Reticulocytes	0	0	0	0	0	0	0.1 ± 0.3	0	0.1 ± 0.3

Each value represents the mean ± SD.

*, **: Significantly different from the control at p < 0.05 and p < 0.01, respectively

Table 8. Hematology data of female F344 rats fed diet containing Bengel-clea or Bengel-flake for 13 weeks

Treatment	Control	Bengel-clea				Bengel-flake			
		0.04%	0.20%	1%	5%	0.04%	0.20%	1%	5%
No. of animals	10	10	10	10	10	10	10	10	10
WBC (x10 ² /μl)	41 ± 8	36 ± 5	35 ± 12	34 ± 8	34 ± 12	34 ± 7	37 ± 9	37 ± 10	42 ± 8
RBC (x10 ⁴ /μl)	884 ± 51	903 ± 35	866 ± 66	887 ± 20	887 ± 48	870 ± 42	871 ± 28	881 ± 48	901 ± 32
HGB (g/dL)	16.4 ± 0.8	16.9 ± 0.4	16.4 ± 1.1	16.8 ± 0.5	16.3 ± 0.5	16.1 ± 0.6	16.2 ± 0.5	16.4 ± 0.8	17.0 ± 0.5
HCT (%)	49.6 ± 2.7	50.5 ± 1.9	48.5 ± 3.6	49.9 ± 1.0	49.6 ± 2.3	48.6 ± 2.3	48.7 ± 1.3	49.4 ± 2.6	50.5 ± 1.7
MCV (fL)	56.1 ± 0.4	55.9 ± 0.3	56.1 ± 0.2	56.2 ± 0.5	55.9 ± 0.5	55.9 ± 0.4	55.9 ± 0.4	56.1 ± 0.2	56.1 ± 0.2
MCH (pg)	18.6 ± 0.5	18.7 ± 0.6	19.0 ± 0.4	19.0 ± 0.5	18.4 ± 0.5	18.5 ± 0.6	18.6 ± 0.5	18.7 ± 0.5	18.9 ± 0.8
MCHC (g/dL)	33.1 ± 0.7	33.4 ± 1.0	33.9 ± 0.6	33.7 ± 0.7	33.0 ± 0.7	33.1 ± 1.2	33.3 ± 0.9	33.2 ± 0.8	33.6 ± 1.2
PLT (x10 ⁴ /μl)	79.7 ± 6.2	80.7 ± 3.3	79.8 ± 9.2	81.2 ± 4.8	79.9 ± 5.7	77.1 ± 7.4	79.4 ± 4.1	79.5 ± 6.6	79.9 ± 5.5
Differential counts (%)									
Band form neutrophils	0.1 ± 0.2	0.3 ± 0.3	0.1 ± 0.2	r ₀	0.2 ± 0.3	0.3 ± 0.4	0.2 ± 0.3	0.2 ± 0.2	0.3 ± 0.3
Segmented neutrophils	26.1 ± 4.6	25.8 ± 6.2	27.3 ± 6.6	27.7 ± 5.6	31.3 ± 5.5	28.9 ± 5.9	33.3 ± 4.4*	26.5 ± 6.1	24.5 ± 5.2
Eosinophils	1.4 ± 0.7	1.5 ± 0.9	1.3 ± 0.7	1.4 ± 0.9	1.1 ± 0.7	1.4 ± 1.0	1.4 ± 0.8	2.0 ± 0.7	1.5 ± 1.1
Basophils	r ₀	r ₀	r ₀	r ₀	r ₀	r ₀	r ₀	r ₀	r ₀
Lymphocytes	71.8 ± 4.3	72.2 ± 5.4	71.2 ± 6.6	70.5 ± 6.0	66.9 ± 6.1	68.9 ± 6.0	64.9 ± 4.4*	71.2 ± 5.9	73.3 ± 5.4
Monocytes	0.6 ± 0.7	0.2 ± 0.3	0.1 ± 0.2	0.5 ± 0.6	0.6 ± 0.6	0.7 ± 0.8	0.2 ± 0.3	0.3 ± 0.5	0.4 ± 0.6
Reticulocytes	0.1 ± 0.3	0.2 ± 0.4	0.2 ± 0.4	r ₀	0.2 ± 0.4	r ₀	0.4 ± 0.5	0.3 ± 0.7	0.3 ± 0.7

Each value represents the mean ± SD.

*, **: Significantly different from the control at p < 0.05 and p < 0.01, respectively

Table 9. Biochemical changes of male F344 rats fed diet containing Bengel-clea or Bengel-flake for 13 weeks

Treatment	Control	Bengel-clea				Bengel-flake			
		0.04%	0.20%	1%	5%	0.04%	0.20%	1%	5%
No. of animals	10	10	10	10	10	10	10	10	10
TP g/dL	6.7 ± 0.2	6.6 ± 0.2	6.6 ± 0.2	6.6 ± 0.2	6.5 ± 0.1	6.6 ± 0.2	6.6 ± 0.1	6.5 ± 0.3	6.6 ± 0.3
Alb g/dL	1.9 ± 0.1	1.9 ± 0.2	1.9 ± 0.1	1.8 ± 0.2	1.9 ± 0.1	2.0 ± 0.1	2.0 ± 0.1	2.0 ± 0.2	2.0 ± 0.1
A/G	4.4 ± 0.1	4.3 ± 0.1	4.3 ± 0.1	4.3 ± 0.2	4.3 ± 0.1	4.3 ± 0.1	4.4 ± 0.1	4.3 ± 0.1	4.3 ± 0.2
Bil mg/dL	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.00
Glucose mg/dL	170 ± 8	163 ± 18	162 ± 11	167 ± 17	169 ± 31	168 ± 17	158 ± 14	156 ± 27	164 ± 11
TG mg/dL	135 ± 30	123 ± 24	124 ± 28	120 ± 25	96 ± 15*	121 ± 28	114 ± 23	111 ± 50	139 ± 25
T-Cho mg/dL	68 ± 6	67 ± 4	70 ± 4	67 ± 4	66 ± 4	66 ± 6	68 ± 4	65 ± 5	66 ± 4
BUN mg/dL	24 ± 3	22 ± 2	21 ± 2*	22 ± 2	22 ± 2	23 ± 2	22 ± 2	22 ± 3	24 ± 3
Cre mg/dL	0.30 ± 0.02	0.31 ± 0.03	0.29 ± 0.01	0.31 ± 0.01	0.29 ± 0.02	0.31 ± 0.01	0.31 ± 0.02	0.30 ± 0.04	0.30 ± 0.03
Na mEq/L	145 ± 1	145 ± 0	145 ± 1	145 ± 1	144 ± 1	145 ± 1	145 ± 1	144 ± 1	144 ± 1*
Cl mEq/L	105 ± 1	105 ± 1	104 ± 1	105 ± 1	104 ± 1	104 ± 1	104 ± 1	104 ± 1	104 ± 2*
K mEq/L	4.5 ± 0.1	4.6 ± 0.2	4.5 ± 0.1	4.5 ± 0.1	4.6 ± 0.2	4.5 ± 0.1	4.5 ± 0.2	4.6 ± 0.3	4.6 ± 0.2
Ca mg/dL	10.2 ± 0.2	10.2 ± 0.2	10.1 ± 0.2	10.3 ± 0.2	10.0 ± 0.2*	10.2 ± 0.1	10.3 ± 0.1	10.2 ± 0.3	10.1 ± 0.2
IP mg/dL	5.4 ± 0.8	5.5 ± 0.6	5.4 ± 0.4	5.6 ± 0.1	5.8 ± 0.3	5.5 ± 0.3	5.3 ± 0.6	5.3 ± 0.6	5.3 ± 0.5
AST IU/L	82 ± 16	85 ± 10	82 ± 11	79 ± 12	78 ± 12	82 ± 6	88 ± 20	82 ± 14	84 ± 19
ALT IU/L	58 ± 13	59 ± 8	57 ± 11	55 ± 6	52 ± 7	57 ± 4	62 ± 12	54 ± 8	53 ± 10
ALP IU/L	418 ± 36	414 ± 31	405 ± 42	420 ± 24	398 ± 19	421 ± 16	411 ± 21	403 ± 32	440 ± 33
YGTP IU/L	<3	<3	<3	<3	<3	<3	<3	<3	<3

Each value represents the mean ± SD.

*: Significantly different from control v.s. administered group at p < 0.05

Table 10. Biochemical changes of female F344 rats fed diet containing Bengel-clea or Bengel-flake for 13 weeks

Treatment	Control	Bengel-clea				Bengel-flake			
		0.04%	0.20%	1%	5%	0.04%	0.20%	1%	5%
No. of animals	10	10	10	10	10	10	10	10	10
TP g/dL	6.5 ± 0.2	6.5 ± 0.2	6.4 ± 0.2	6.5 ± 0.2	6.5 ± 0.4	6.4 ± 0.2	6.5 ± 0.3	6.4 ± 0.2	6.5 ± 0.2
Alb g/dL	2.3 ± 0.2	2.3 ± 0.2	2.4 ± 0.2	2.3 ± 0.2	2.2 ± 0.1	2.4 ± 0.2	2.3 ± 0.1	2.4 ± 0.1	2.3 ± 0.2
A/G	4.5 ± 0.2	4.5 ± 0.2	4.5 ± 0.1	4.5 ± 0.1	4.5 ± 0.3	4.5 ± 0.1	4.5 ± 0.2	4.5 ± 0.1	4.5 ± 0.2
Bil mg/dL	0.03 ± 0.03	0.05 ± 0.01*	0.04 ± 0.01	0.05 ± 0.01*	0.05 ± 0.01**	0.05 ± 0.01	0.05 ± 0.01*	0.05 ± 0.01*	0.05 ± 0.00*
Glucose mg/dL	138 ± 11	126 ± 14	124 ± 22	129 ± 19	126 ± 18	134 ± 11	126 ± 14	136 ± 10	137 ± 15
TG mg/dL	62 ± 29	64 ± 28	57 ± 22	50 ± 25	57 ± 34	62 ± 23	76 ± 39	66 ± 34	74 ± 23
T-Cho mg/dL	90 ± 9	92 ± 6	91 ± 5	87 ± 5	86 ± 8	88 ± 5	87 ± 11	94 ± 10	93 ± 7
BUN mg/dL	23 ± 4	22 ± 2	21 ± 3	21 ± 3	22 ± 2	22 ± 2	22 ± 2	22 ± 1	22 ± 3
Cre mg/dL	0.32 ± 0.02	0.31 ± 0.03	0.31 ± 0.02	0.32 ± 0.02	0.31 ± 0.02	0.31 ± 0.01	0.32 ± 0.02	0.33 ± 0.02	0.33 ± 0.03
Na mEq/L	144 ± 1	145 ± 1	144 ± 1	145 ± 1	145 ± 1	144 ± 1	145 ± 1	144 ± 1	144 ± 0
Cl mEq/L	107 ± 1	106 ± 1	106 ± 1	107 ± 1	106 ± 1	106 ± 1	106 ± 1	106 ± 1	106 ± 1
K mEq/L	4.2 ± 0.2	4.1 ± 0.2	4.3 ± 0.1	4.2 ± 0.1	4.4 ± 0.5	4.2 ± 0.2	4.2 ± 0.3	4.1 ± 0.2	4.2 ± 0.2
Ca mg/dL	9.9 ± 0.2	10.0 ± 0.3	9.9 ± 0.1	9.9 ± 0.2	10.1 ± 0.3	10.0 ± 0.1	10.0 ± 0.1	10.1 ± 0.3	10.0 ± 0.3
IP mg/dL	4.6 ± 0.5	4.9 ± 1.0	4.8 ± 0.9	4.8 ± 1.0	5.2 ± 1.1	4.9 ± 0.5	4.3 ± 0.9	4.2 ± 0.7	4.6 ± 0.7
AST IU/L	70 ± 7	74 ± 12	69 ± 6	68 ± 5	74 ± 19	68 ± 6	69 ± 5	67 ± 4	68 ± 2
ALT IU/L	43 ± 7	40 ± 4	38 ± 6	35 ± 6*	39 ± 6	41 ± 6	40 ± 5	37 ± 2	43 ± 10
ALP IU/L	276 ± 43	269 ± 41	253 ± 40	275 ± 35	248 ± 24	273 ± 39	260 ± 49	278 ± 41	267 ± 32
YGTP IU/L	<3	<3	<3	<3	<3	<3	<3	<3	<3

Each value represents the mean ± SD.

*, **: Significantly different from control v.s. administered group at p < 0.05 and p < 0.01, respectively

Table 11. Histopathological findings for F344 rat in the 13-week repeated dose study of Bengel-clea or Bengel-flake

Sex	Treatment	Male			Female		
		Control	Bengel-clea 5 %	Bengel-flake 5 %	Control	Bengel-clea 5 %	Bengel-flake 5 %
	No. of animals	10	10	10	10	10	10
Liver							
	Microgranuloma	4	2	1	2	3	0
Kidney							
	Cast, hyaline	3	5	5	0	1	0
	Mineralization, medulla	4	5	5	1	1	1
	Regeneration, tubular	7	8	9	0	2	0
Heart							
	Cardiomyopathy	4	4	6	0	0	0
Lung							
	Metaplasia, osseous	0	0	1	0	0	1
Spleen							
	Hematopoiesis, extramedullary	3	2	4	1	0	0
Sublingual gland							
	Cell infiltration, interstitial, lymphocytic	0	0	0	1	0	0
Pancreas							
	Atrophy, acinar, focal	0	0	1	2	0	0
Thyroid							
	Ultimobranchial body	1	2	1	0	0	3
Prostate							
	Cell infiltration, interstitial, lymphocytic	3	3	3	-	-	-
Eye							
	Atrophy, retinal	0	0	0	2	1	0
Harderian gland							
	Cell infiltration, interstitial, lymphocytic	2	0	1	3	1	2
Bone marrow, femoral							
	Microgranuloma	0	0	0	2	2	3
Bone marrow, sternal							
	Microgranuloma	0	0	0	1	0	0

Table12. Food consumption and material intake of F344 rats fed diet containing montmorillonite for 13 weeks

Sex	treatment	Dose (%)	No. of animals examined	Food consumption		Intake of Sumecton or Kunipia	
				(g/rat/day)	(g/kg BW/day)	Daily (g/kg BW/day)	Total (g/kg BW)
				male	control	0	10
	Sumecton	0.2	10	13.8 ± 0.7	53.8 ± 12.9	0.11	9.69
		1	10	14.0 ± 0.7	54.7 ± 13.8	0.55	49.19
		5	10	14.8 ± 0.7	58.2 ± 14.3	2.91	261.68
	Kunipia	0.2	10	14.2 ± 0.5	55.7 ± 13.6	0.11	10.02
		1	10	14.1 ± 0.6	55.0 ± 13.1	0.55	49.53
		5	10	14.8 ± 0.6	57.8 ± 14.5	2.89	260.09
female	control	0	10	8.7 ± 0.3	59.0 ± 12.3	0	0
	Sumecton	0.2	10	9.2 ± 0.6	58.3 ± 12.7	0.12	10.49
		1	10	9.2 ± 0.7	59.2 ± 12.9	0.59	53.31
		5	10	10.0 ± 0.8	63.1 ± 13.5	3.15	283.91
	Kunipia	0.2	10	9.1 ± 0.6	59.5 ± 12.6	0.12	10.71
		1	10	8.9 ± 0.6	57.8 ± 12.5	0.58	52.03
		5	10	9.6 ± 0.5	61.8 ± 12.8	3.09	278.27

Table 13. Organ weights of male F344 rats fed diet containing montmorillonite for 13 weeks

Treatment	Control		Sumecton				Kunipia		
			0.2%	##		0.2%	1%	5%	
No. of animals	10	10	10	10	10	10	10	10	10
Body weight (g)	319.0 ± 11.9	320.7 ± 14.3	323.6 ± 8.5	319.6 ± 17.1	323.7 ± 8.4	322.1 ± 16.8	320.4 ± 9.3		
Absolute									
Brain (g)	2.01 ± 0.04	1.99 ± 0.04	1.99 ± 0.05	1.98 ± 0.08	1.96 ± 0.05	2.00 ± 0.04	2.02 ± 0.04		
Thymus (g)	0.19 ± 0.02	0.18 ± 0.04	0.18 ± 0.04	0.18 ± 0.02	0.19 ± 0.02	0.18 ± 0.02	0.18 ± 0.02		
Lungs (g)	1.00 ± 0.08	1.04 ± 0.15	1.00 ± 0.10	1.04 ± 0.11	1.05 ± 0.10	1.00 ± 0.10	1.02 ± 0.10		
Heart (g)	0.93 ± 0.05	0.92 ± 0.04	0.93 ± 0.03	0.93 ± 0.06	0.95 ± 0.04	0.94 ± 0.04	0.96 ± 0.05		
Spleen (g)	0.65 ± 0.03	0.63 ± 0.04	0.66 ± 0.04	0.63 ± 0.05	0.64 ± 0.02	0.62 ± 0.05	0.65 ± 0.03		
Liver (g)	7.33 ± 0.55	7.41 ± 0.38	7.35 ± 0.24	6.80 ± 1.93	7.45 ± 0.41	7.34 ± 0.50	7.27 ± 0.39		
Adrenals (g)	0.04 ± 0.01	0.04 ± 0.00	0.04 ± 0.00	0.04 ± 0.00	0.05 ± 0.01	0.04 ± 0.00	0.04 ± 0.01		
Kidneys (g)	1.88 ± 0.09	1.91 ± 0.11	1.90 ± 0.12	1.89 ± 0.14	1.93 ± 0.10	1.93 ± 0.14	1.90 ± 0.12		
Gonads (g)	3.16 ± 0.15	3.02 ± 0.28	3.11 ± 0.08	3.13 ± 0.11	3.11 ± 0.06	3.18 ± 0.09	3.09 ± 0.12		
Relative									
Brain (g%)	0.63 ± 0.02	0.62 ± 0.03	0.61 ± 0.02	0.62 ± 0.03	0.61 ± 0.01	0.62 ± 0.03	0.63 ± 0.02		
Thymus (g%)	0.06 ± 0.01	0.06 ± 0.01	0.05 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	0.06 ± 0.01		
Lungs (g%)	0.31 ± 0.03	0.32 ± 0.04	0.31 ± 0.04	0.33 ± 0.03	0.32 ± 0.03	0.31 ± 0.03	0.32 ± 0.03		
Heart (g%)	0.29 ± 0.01	0.29 ± 0.01	0.29 ± 0.01	0.29 ± 0.01	0.29 ± 0.01	0.29 ± 0.01	0.30 ± 0.02		
Spleen (g%)	0.20 ± 0.01	0.20 ± 0.01	0.20 ± 0.01	0.20 ± 0.01	0.20 ± 0.01	0.19 ± 0.02	0.20 ± 0.01		
Liver (g%)	2.30 ± 0.11	2.31 ± 0.06	2.27 ± 0.08	2.14 ± 0.06	2.30 ± 0.10	2.28 ± 0.07	2.27 ± 0.09		
Adrenals (g%)	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00		
Kidneys (g%)	0.59 ± 0.03	0.60 ± 0.02	0.59 ± 0.03	0.59 ± 0.04	0.59 ± 0.02	0.60 ± 0.04	0.59 ± 0.03		
Gonads (g%)	0.99 ± 0.05	0.94 ± 0.09	0.96 ± 0.02	0.98 ± 0.06	0.96 ± 0.02	0.99 ± 0.05	0.97 ± 0.05		

Each value represents the mean ± SD.

Table 14. Organ weights of female F344 rats fed diet containing montmorillonite for 13 weeks

Treatment	Control		Sumecton				Kunipia		
			0.2%	##		0.2%	1%	5%	
No. of animals	10	10	10	10	10	10	10	10	10
Body weight (g)	162.6 ± 4.3	180.0 ± 8.7	** 175.3 ± 7.3	** 176.7 ± 10.2	** 173.8 ± 8.0	* 172.9 ± 10.9	* 173.4 ± 6.6		
Absolute									
Brain (g)	1.82 ± 0.04	1.82 ± 0.04	1.82 ± 0.05	1.82 ± 0.04	1.80 ± 0.03	1.81 ± 0.04	1.81 ± 0.03		
Thymus (g)	0.15 ± 0.02	0.16 ± 0.02	0.16 ± 0.03	0.15 ± 0.02	0.17 ± 0.02	0.16 ± 0.02	0.16 ± 0.02		
Lungs (g)	0.62 ± 0.05	0.65 ± 0.11	0.69 ± 0.06	0.70 ± 0.06	0.67 ± 0.07	0.65 ± 0.08	0.72 ± 0.11	*	
Heart (g)	0.55 ± 0.03	0.60 ± 0.03	** 0.58 ± 0.03	0.59 ± 0.02	* 0.59 ± 0.02	* 0.58 ± 0.03	0.59 ± 0.05	*	
Spleen (g)	0.39 ± 0.03	0.43 ± 0.04	** 0.40 ± 0.03	0.41 ± 0.03	0.41 ± 0.03	0.42 ± 0.03	0.41 ± 0.02		
Liver (g)	3.60 ± 0.18	3.91 ± 0.23	* 3.78 ± 0.17	3.84 ± 0.19	3.82 ± 0.22	3.82 ± 0.25	3.80 ± 0.28		
Adrenals (g)	0.04 ± 0.01	0.05 ± 0.01	0.04 ± 0.00	0.05 ± 0.01	0.04 ± 0.00	0.05 ± 0.00	0.05 ± 0.01		
Kidneys (g)	1.05 ± 0.06	1.08 ± 0.06	1.06 ± 0.06	1.11 ± 0.05	1.08 ± 0.07	1.10 ± 0.06	1.09 ± 0.07		
Gonads (g)	0.06 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	0.06 ± 0.01		
Relative									
Brain (g%)	1.12 ± 0.04	1.01 ± 0.05	** 1.04 ± 0.05	** 1.03 ± 0.06	** 1.04 ± 0.05	** 1.05 ± 0.06	* 1.04 ± 0.04	*	
Thymus (g%)	0.09 ± 0.01	0.09 ± 0.01	0.09 ± 0.02	0.09 ± 0.01	0.10 ± 0.01	0.09 ± 0.01	0.09 ± 0.01		
Lungs (g%)	0.38 ± 0.03	0.36 ± 0.05	0.39 ± 0.04	0.40 ± 0.03	0.39 ± 0.04	0.38 ± 0.05	0.42 ± 0.06		
Heart (g%)	0.34 ± 0.01	0.33 ± 0.02	0.33 ± 0.02	0.34 ± 0.02	0.34 ± 0.01	0.34 ± 0.02	0.34 ± 0.02		
Spleen (g%)	0.24 ± 0.02	0.24 ± 0.02	0.23 ± 0.02	0.23 ± 0.01	0.24 ± 0.02	0.24 ± 0.01	0.24 ± 0.01		
Liver (g%)	2.21 ± 0.11	2.17 ± 0.06	2.16 ± 0.08	2.18 ± 0.08	2.20 ± 0.11	2.21 ± 0.11	2.19 ± 0.11		
Adrenals (g%)	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00		
Kidneys (g%)	0.65 ± 0.04	0.60 ± 0.02	* 0.61 ± 0.04	0.63 ± 0.03	0.62 ± 0.04	0.64 ± 0.05	0.63 ± 0.04		
Gonads (g%)	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	0.04 ± 0.00	0.03 ± 0.01	0.03 ± 0.00	0.04 ± 0.00		

Each value represents the mean ± SD.

*, **: Significantly different from control v.s. administered group at p < 0.05 and p < 0.01, respectively

Table 15. Hematology date of male F344 rats fed diet containing montmorillonite for 13 weeks

Treatment	Control	Sumecton			Kunipia		
		0.2%	1%	5%	0.2%	1%	5%
No. of animals	10	10	10	10	10	10	10
WBC (x10 ² /μl)	30 ± 7	26 ± 9	26 ± 9	25 ± 8	26 ± 8	26 ± 9	33 ± 5
RBC (x10 ⁴ /μl)	949 ± 80	950 ± 65	972 ± 80	930 ± 65	925 ± 49	973 ± 62	984 ± 27
HGB (g/dL)	16.0 ± 1.2	16.2 ± 1.0	16.5 ± 1.4	15.9 ± 1.1	15.9 ± 0.8	16.6 ± 1.0	16.8 ± 0.4
HCT (%)	50.7 ± 3.8	51.2 ± 2.6	51.7 ± 3.8	49.9 ± 3.2	49.8 ± 2.6	52.2 ± 3.4	52.9 ± 0.9
MCV (fL)	53.5 ± 1.2	53.9 ± 1.1	53.2 ± 0.6	53.6 ± 0.4	53.8 ± 0.4	53.6 ± 0.8	53.8 ± 0.9
MCH (pg)	16.9 ± 0.4	17.1 ± 0.3	17.0 ± 0.3	17.1 ± 0.2	17.1 ± 0.5	17.0 ± 0.3	17.1 ± 0.2
MCHC (g/dL)	31.6 ± 0.4	31.7 ± 0.5	31.9 ± 0.6	32.0 ± 0.5	31.9 ± 0.8	31.7 ± 0.4	31.8 ± 0.5
PLT (x10 ⁴ /μl)	70.8 ± 7.4	76.1 ± 8.9	77.1 ± 8.8	72.4 ± 6.2	73.5 ± 6.9	76.8 ± 4.4	75.4 ± 4.9

Each value represents the mean ± SD.

*, **: Significantly different from the control at $p < 0.05$ and $p < 0.01$, respectively

Table 16. Hematology date of female F344 rats fed diet containing montmorillonite for 13 weeks

Treatment	Control	Sumecton			Kunipia		
		0.2%	1%	5%	0.2%	1%	5%
No. of animals	10	10	10	10	10	10	10
WBC (x10 ² /μl)	24 ± 8	26 ± 10	23 ± 4	24 ± 7	19 ± 5	20 ± 4	21 ± 6
RBC (x10 ⁴ /μl)	834 ± 46	823 ± 40	851 ± 24	808 ± 53	840 ± 30	824 ± 27	837 ± 31
HGB (g/dL)	15.3 ± 0.7	15.4 ± 0.6	15.9 ± 0.4	15.2 ± 1.0	15.6 ± 0.6	15.4 ± 0.6	15.5 ± 0.4
HCT (%)	48.2 ± 1.6	47.6 ± 1.7	48.7 ± 1.3	46.4 ± 3.1	48.7 ± 1.6	48.0 ± 1.5	48.4 ± 1.2
MCV (fL)	57.9 ± 2.0	57.9 ± 1.6	57.2 ± 0.4	57.4 ± 0.6	58.1 ± 0.8	58.3 ± 1.2	57.8 ± 1.6
MCH (pg)	18.4 ± 0.3	18.7 ± 0.5	18.7 ± 0.2	18.8 ± 0.4	18.5 ± 0.3	18.7 ± 0.4	18.5 ± 0.5
MCHC (g/dL)	31.8 ± 0.7	32.4 ± 0.7	32.7 ± 0.3	32.7 ± 0.8	32.0 ± 0.5	32.1 ± 0.5	32.0 ± 0.4
PLT (x10 ⁴ /μl)	75.1 ± 4.6	77.9 ± 5.5	74.4 ± 5.9	68.7 ± 7.2	72.5 ± 4.8	70.6 ± 8.8	70.9 ± 2.2

Each value represents the mean ± SD.

** : Significantly different from the control at $p < 0.01$

Table 17. Blood biochemical changes of male F344 rats fed diet containing montmorillonite for 13 weeks

Treatment	Control	Sumecton			Kunipia		
		0.2%	1%	5%	0.2%	1.0%	5%
No. of animals	10	10	10	10	10	10	10
TP g/dL	6.5 ± 0.2	6.5 ± 0.2	6.4 ± 0.3	6.3 ± 0.3	6.4 ± 0.2	6.3 ± 0.3	6.3 ± 0.2
Alb g/dL	4.2 ± 0.1	4.2 ± 0.1	4.2 ± 0.2	4.1 ± 0.2	4.2 ± 0.2	4.1 ± 0.2	4.1 ± 0.1
A/G	1.8 ± 0.1	1.9 ± 0.1	1.9 ± 0.1	1.9 ± 0.1	1.9 ± 0.1	1.9 ± 0.1	1.9 ± 0.1
Bil mg/dL	0.04 ± 0.01	0.04 ± 0.01	0.03 ± 0.01	0.04 ± 0.01	0.03 ± 0.01	0.03 ± 0.01	0.03 ± 0.00
Glu mg/dL	158 ± 24	151 ± 18	144 ± 27	130 ± 18	153 ± 37	151 ± 24	156 ± 40
TG mg/dL	89 ± 16	71 ± 16	65 ± 19	53 ± 14*	75 ± 25	82 ± 31	68 ± 33
T-Cho mg/dL	59 ± 5	57 ± 5	56 ± 4	56 ± 5	57 ± 5	56 ± 5	56 ± 6
BUN mg/dL	19 ± 2	18 ± 1	18 ± 2	17 ± 1	18 ± 3	18 ± 2	18 ± 3
Cre mg/dL	0.29 ± 0.02	0.28 ± 0.02	0.27 ± 0.02	0.26 ± 0.02	0.28 ± 0.03	0.29 ± 0.04	0.30 ± 0.02
Na mEQ/L	143 ± 1	143 ± 1	142 ± 2	144 ± 1	142 ± 3	141 ± 3	142 ± 1
Cl mEQ/L	102 ± 2	103 ± 2	101 ± 2	102 ± 1	101 ± 3	100 ± 2	101 ± 1
K mEQ/L	4.4 ± 0.2	4.4 ± 0.2	4.5 ± 0.2	4.4 ± 0.2	4.4 ± 0.1	4.3 ± 0.2	4.3 ± 0.2
Ca mg/dL	10.1 ± 0.1	10.0 ± 0.3	9.9 ± 0.3	9.9 ± 0.2	9.9 ± 0.4	9.8 ± 0.4	9.9 ± 0.2
IP mg/dL	5.4 ± 0.2	5.5 ± 0.6	5.8 ± 0.3	6.0 ± 0.5	5.1 ± 0.7	5.1 ± 0.5	5.4 ± 0.7
AST IU/L	89 ± 13	89 ± 14	85 ± 7	84 ± 8	93 ± 16	95 ± 20	88 ± 12
ALT IU/L	57 ± 5	54 ± 9	51 ± 6	48 ± 7	59 ± 14	54 ± 9	50 ± 7
ALP IU/L	338 ± 18	347 ± 17	348 ± 20	346 ± 24	355 ± 40	351 ± 33	350 ± 32
γGTP IU/L	<3	<3	<3	<3	<3	<3	<3

Each value represents the mean ± SD.

*: Significantly different from control v.s. administered group at $p < 0.05$